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CONCORDE LANDING REQUIREMENT EVALUATION TESTS

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16. Abstract

Tests of two late model jet transports, a Lockheed L-1011 and a Boeing 737 ADV., were conducted at Roswell, N.M. during the period of October 12-26, 1973, for the purpose of evaluating the Concorde SST Special Condition Landing Requirement. Flight path angle during approach, landing weight, approach speed, sink rate at touchdown were all varied. Landings were made on both a wet and dry surface and up to five ground friction measurement vehicles were evaluated along with the aircraft. The landing requirement was shown to be feasible. Two minor changes to the requirement, both relaxatory, are indicated. One, change the reference approach flight path angle from 2.5° to 3° and two, revise the touchdown rate-of-sink requirement from a 3 ft./sec. maximum to a 3 ft./sec. mean with the maximum test data point not to exceed 5 ft/sec. The procedure for relating aircraft effective braking friction coefficient, μ_B, to the aircraft and the Diagonal-braked vehicle wet-to-dry stopping distance ratio (SDR) is shown to be adequate to establish Flight Manual data.

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TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

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LIST OF TABLES

1.0 INTRODUCTION

The Federal Aviation Administration, in 1972, issued Concorde SST Special Condition 25-43-EU-12 which contains a new approach to a landing requirement. (See Appendix I) The Concorde requirement evolved through a series of meetings between French-Anglo-United States Airworthiness Authorities. The more formal of these were designated French-Anglo-U.S. Supersonic Transport (FAUSST) meetings. In FAUSST VIII, January 1971, the final framework of the Concorde landing requirement was established and subsequent informal meetings between the three parties settled the details. Part of the agreements reached during the numerous discussions was a U.S. commitment to evaluate the Concorde landing requirement to ascertain if all facets of the requirement could be applied in a practical manner without overburdening the certification test program. Immediately after issuance of the Concorde Special Conditions in June 1972, the FAA placed a high priority on obtaining the promised evaluation. The work that followed resulted in the following contracts (arrived at through an open competition, proposal and negotiating procedure) and agreements:

1. FAA Contract DOT-FA74WA-3344 with Lockheed Aircraft Corporation for lease of a L-1011, designated the base aircraft, for use in evaluating the entire landing requirement.

2. FAA Contract DOT-FA74WA-3343 with Boeing Commercial Aircraft Company for lease of an advanced B-737, designated as a supplemental aircraft, for use in evaluating a more limited portion of the landing requirement. Included in this contract was a Miles Trailer and Runway Wetting Services.

3. A letter of agreement with the National Aeronautics and Space Administration for use of the NASA Diagonal-Braked Vehicle (DBV), photographic coverage, and miscellaneous test equipment.

4. An interagency agreement with the U.S. Air Force for use of their Mu-Meter, IAA DOT-FA74WAI-433.

5. A letter of agreement with Sweden September 20, 1973, for loan and use of a BV-11-2 Skiddometer.

6. Members of various aerospace industry organizations and foreign airworthiness organizations were also invited to participate. The invitations included Aerospace Industries Association (AIA), Air Transport Association (ATA), Air Line Pilots Association (ALPA), Allied Pilots Association (APA), Canada Ministry of Transport (MOT), U.K. Civil Aviation Authority (UK-CAA), and French STAe .

The evaluation tests were accomplished at Roswell, New Mexico during the period October 12-26, 1973. This report contains pertinent descriptions of equipment, test procedures, test variables, test data, analysis of the tests, application of results to swept wing jet transports and minor requirement modifications applicable to Concorde.

2.0 TEST EQUIPMENT

The Concorde Special Condition landing requirement was evaluated using two aircraft. In conjunction with the aircraft tests, four, and at times, five ground vehicle friction measuring devices were also tested to gather additional data for comparison with the aircraft wet stopping distances obtained.

2.1 Aircraft - Two aircraft, a Lockheed 1011 and a Boeing 737 - Advanced, were used in the evaluation tests.

2.1.1 The Lockheed 1011 is a subsonic commercial transport aircraft powered by three Rolls-Royce RB.211-22 high bypass ratio turbofan engines. Two engines are mounted in underwing pylons and the third engine is mounted in the fuselage aft body. The wing has a 155 ft. 4 in. span, a reference area of 3456 square feet and the sweep back at 0.25 chord line is 35 degrees. The general arrangement of the aircraft is shown in Figure 1. The gross weight was varied between 295,000 and 366,400 pounds for these tests. The test aircraft was fully instrumented. The signal block diagram of the L-1011 instrumentation is shown in Figure 2. The list of instrumentation, including accuracy, is shown in Table I.

2.1.2 The Boeing 737-Advanced is a subsonic commercial transport aircraft powered by two JT8D-15 engines with target type thrust reversers. The engines were mounted in pods beneath the wing as shown in the general arrangement, Figure 3. The wing span is 93 ft., has a reference area of 980 square feet and the sweep back at the 0.25 chord line is 25 degrees. The gross weight was varied between 81,600 and 103,100 pounds for these tests. The airborne tape recording system is shown in Figure 4. The list of instrumentation, including accuracy, is shown in Table II.

2.2 Runway Wetting Equipment - As many as 10 water tankers, Figure 5, each with a 5600 gallon capacity, were used to wet the runway for tests of the aircraft and ground friction vehicles. Initially all ten tankers were used to prewet the test section. As soon as refilling could be accomplished, five of the tankers again wet the runway for a ground vehicle - aircraft landing-ground vehicle sequence of operations. Subsequently, five water tankers were used to wet the test section prior to each aircraft landing.

2.3 Friction Measurement Ground Vehicles - A total of five vehicles were used during the program to obtain the friction characteristics of the dry and wetted test section.

2.3.1 DBV- Two diagonal-braked vehicles (DBV), one owned by NASA and the other owned by the USAF, were used during the test program, Figure 6. The primary DBV used in this test program was the NASA DBV which is a 1969 Ford XL sedan.

The vehicle is equipped with a high performance engine for rapid acceleration and a diagonal braking system to maintain stability and directional control when braking (locked diagonal wheels) from high speed (60 m.p.h.) to a stop under slippery runway conditions. The vehicle weighed approximately 5200 pounds in the test configuration with a driver and ½ fuel load. The stopping distance, speed, and acceleration instrumentation on board the DBV is listed in Table III. The primary stopping distance is obtained from variable 3. Alternate stopping distance measurements, in order of preference (accuracy) are variables 5, 6, and 8. The primary brake application speed measurement is variable 4. Alternate brake application speeds in order of preference (accuracy) are variables 2 and 9. Positive indications of diagonal-braked wheel lock-ups were determined from variable 7.

2.3.1.1 Stopping distance instrumentation is calibrated by driving the DBV over a 1000 ft. measured distance on a straight airport taxiway section. Adjustments necessary to match vehicle stopping distance with the measured distance can be obtained by increasing or lowering the 5th wheel tire inflation pressure. The stopping distance calibration on variable 3 automatically calibrates ground speed measured by variable 2.

2.3.1.2 The DBV when on test location (airport) is configured as shown in Figure 7. The diagonal pair of smooth test tires are ASTM smooth tread test tires (Specification E-249) inflated to 24 psi. The opposite unbraked diagonal tire pair are standard road tires of good tread design inflated to 32 psi.

2.3.2 Mu-Meter - The Mu-Meter is a side force measuring trailer shown diagramatically in Figure 8. The total weight of the trailer is 542 pounds of which about 250 pounds is removable ballast. The Mu-Meter is towed by any suitable automobile or light truck equipped with a suitable towing hitch.

2.3.2.1 The Mu-Meter instrumentation consists of a chart recorder which is mechanically driven by the rear central wheel of the trailer. The recorder drive is arranged such that one inch on the chart is equal to approximately 450 feet of runway surface. The chart recorder has two channels; one for recording the side force friction reading (Scale 0-1.0) and the other for use as an event marker (bulb operated). Towing speed for the Mu-Meter is determined from the towing vehicle speedometer.

2.3.2.2 The Mu-Meter friction reading (side force) is calibrated by means of the friction board provided with the Mu-Meter and according to the instruction manual. It is important that the test tires be inflated to 10 psi and the rear central tire be inflated to 30 psi during calibration and before testing. The towing vehicle speedometer is calibrated by running over a measured distance or against another speedometer whose calibration is known. The operating speed of the Mu-Meter is a constant 40 m.p.h. The tread from new Mu-Meter test tires must be removed prior to friction measurements by running the Mu-Meter on dry pavement long enough to remove the tread design.

2.3.3 Sweddish Skiddometer - The Skiddometer, Figure 9, is a three-wheeled measuring trailer which provides for the continuous recording of the braking coefficient of friction of runway surfaces. The three wheels of equal size are connected mechanically so that the center wheel rotates at a constant brake slip ratio of about 17 percent. The total weight of the vehicle is 792 pounds. The outer tires are inflated to 25 psi and the measuring wheel pressure is 17 psi. The operating speed of the Skiddometer is a constant 40 m.p.h.

2.3.3.1 The torque applied to the test wheel due to friction was measured by a special torque transponder. The speed of the trailer is measured by a tachometer generator, driven by a roller chain. A cable between the trailer and the towing car connects these electrical signals to a strip chart recorder beside the driver where the momentary value of friction coefficient as a function of surface length can be recorded. The measuring system is powered from the battery of the towing car (12V D.C.) and the duration of measurement is controlled by a toggle switch. Recording range of the friction coefficient is from 0 to 1.0. A value as low as 0.05 can be clearly read (deflection of 5mm). The sensitivity of the measuring system is such that the accuracy is within $\pm 1.5\%$ at the maximum end of the recording range, and therefore, the accuracy is estimated to be within 2 to 3% totally.

2.3.4 Miles Trailer - The Miles Engineering Company, Ltd., version of the U.K. Road Research Laboratory trailer, Figure 10, is a single wheel trailer that measures the locked wheel braking force coefficient. The 16 inch diameter, 4 inch wide tire is inflated to 20 psi, and is loaded to 317 pounds. The brake is actuated by a vacuum servo controlled by the operator in the towing vehicle. Braking forces are measured by means of a torque arm attached to the brake, operating a strain gage link which actuates an electronic pen recorder with a moving chart. Calibration is checked at frequent intervals by applying known braking forces to the trailer wheel. Data points are obtained between 85 and zero knots as the vehicle slows down over the length of the test section.

2.4 Other Ground Instrumentation and Equipment

2.4.1 Water Depth Gages - Water depth on the runway was measured by a gage designed by NASA. The gage works on the principle of reflectivity. Plexiglass rods of different lengths that protrude through its body are calibrated and marked with numbers from 0.0 to 0.10 inch to indicate water depth. Since water is highly reflective and will reflect more light than the runway surface, rods that are not touching the water will appear lighter than those that are touching or submerged in water. The dark rod with highest number, therefore, indicates that the water depth is between this value and the next higher rod number.

2.4.2 Runway Markers - Three lead-in and seven test section portable tripod markers were located along the pilot's side of the runway at measured intervals along the test section. The lead-in markers were yellow and the test section markers, lettered A to G on a red background served as reference points to the test crew for marking significant events.

2.4.3 Atmospheric Data - Wind, temperature, barometric pressure and other pertinent data were obtained from a contractor furnished weather station located approximately 150 feet from the edge of the runway, midway of the test section.

2.4.4 Communications - Primary communications were on 123.15 MH_Z for the ground control to aircraft link and 123.25 MH_Z for the ground control to ground vehicle link. An auxiliary channel of 171.15 MH_Z was used for ground crew communications. In addition the Roswell tower ground control frequency of 121.9 MH_Z was used for traffic control of the ground vehicles between test runs.

2.4.5 Photographic Coverage - Movie and still photographic coverage of the tests was obtained by NASA and by each of the prime contractors. Approximately 3400 feet of 16 mm color movie film was used by NASA in recording the test program. Footage from Lockheed and Boeing are also available for use in a possible future documentary film.

3.0 TEST VARIABLES

3.1 General - In order to assess the effects of speed, approach angle, etc. on the total landing distance the following parameters were varied during the test program: Approach speed, approach path angle, touchdown rate of sink, landing weight, brake application speed, reverse thrust, dry and wet runway conditions.

3.1.1 Table IV depicts the run schedule with the parameter variables for the L-1011.

3.1.2 Table V depicts the run schedule with the parameter variables for the B-737.

3.2 Ground Vehicle Test - On October 15, and October 22, 1973 a separate set of ground vehicle tests were conducted to: (1) establish the appropriate speed and instrumentation calibration, and (2) to obtain data on the test runway in both the dry and wet conditions.

3.2.1 On October 15, 1973, due to mechanical problems with the Skiddometer, only the NASA DBV and USAF Mu-Meter were tested. Three sections of the runway, designated A-B, C-D, and E-F, Figure 11, were tested in a wet condition. Dry friction values were also obtained by both vehicles. The data sample was too small to analyze but the values obtained are shown in Table VI.

Table VI
DBV and Mu-Meter Results from
October 15, 1973 Tests on Runway 03
Roswell, N.M.

Test Section	DBV SDR	1/SDR	Mu-Meter Avg. μ 40.
A-B	2.52	.397	.28
C-D	2.45	.408	.24
E-F	2.72	.367	.23

3.2.2 On October 22, 1973, the following ground vehicles were tested on four sections of runway 03 at Roswell, N.M.:

1. Mu-Meter

2. BV-11-2 Skiddometer

3. NASA DBV

4. Miles Trailer

5. USAF DBV

The four sections were A-B, C-D, E-F and X-X. The latter corresponds to water depth measuring station 13 and 14 shown on Figure 11 and consisted of relatively heavy rubber deposits on the concrete surface. The data are summarized in Table VII.

4.0 TEST PROCEDURES

4.1 Dry Runway - Landings on the dry runway were conducted as rapidly as brake cooling and weight changes could be achieved in order to cover the weight and approach path angle range desired. A stabilized approach speed was established far enough out on the approach path so that a power setting could be established to achieve stabilized flight along the selected flight path angle. Brakes were applied at varying times after touchdown and maximum anti-skid braking was used until the aircraft came to a complete stop. The landing flare was accomplished to approximate a 3 ft./sec. touchdown rate.

4.2 Wet Runway - Wet runway landings required more preparation and a closely coordinated operation to obtain the required number of landings in the time available. The procedure consisted of the following sequence:

(1) Prewet the runway test section. Ten water tank trucks, each of approximately 5600 gallon capacity, were used for this operation.

The tankers were deployed in two groups of five each across the runway. The second group of tankers followed the first group at an interval of approximately 1000 feet. The time to wet approximately 5000 feet of runway was 15 minutes.

(2) After the prewetting, the ground test crew consisting of the ground friction measuring vehicles, the team to obtain water depth measurements, the wind station, touchdown observers, cameramen and test control station were deployed.

(3) The test aircraft was dispatched just prior to wetting the runway for a test condition.

(4) Five tanker trucks were used to wet the test section. The tankers were deployed in two groups with three abreast in the lead, positioned on the left side of the runway center line. The two remaining tankers started approximately 1000 feet behind the lead tankers and adjusted speed in order to catch up with the lead tanker at the end of the test section. Tanker positions on the left side of the runway were dictated by the runway configuration which was a tilted slab having a transverse slope of 1 percent left to right. The wetting time normally took 14 to 15 minutes.

(5) Eight water depth measurement stations were used for these tests. Measurements were taken on the runway center line and approximately 12 feet either side of the center line at each station. The measurement positions were marked by a painted circle to ensure consistent measurements. Measurements were made three times during a test; the first, immediately after the last water tankers passed each measuring station; the second, after the aircraft landed and came to a stop; and the third, after the last ground vehicle run of the sequence. A potential total of 72 data points for each test were obtained as a function of time. In some cases, conditions precluded obtaining all of the planned measurements.

(6) Immediately after the initial water depth measurement the ground friction measurement vehicles were dispatched in the following order:

1.	Mu-Meter - left of center line	Run in Parallel
2.	BV-11-2 Skiddometer - right of center line	
3.	NASA DBV - left of center line	Run in Sequence
4.	Miles Trailer - right of center line	
5.	USAF DBV (when available) - left of center line	

(On some runs during the L-1011 tests the positions of the vehicles to left or right of the center line were changed in order to obtain data on differences in measurements due to the difference in water depth that existed on either side of the runway center line).

The ground vehicles were recycled back to the end of the runway while the airplane landed, and as soon as the water depth measurements were made and the aircraft was clear of the runway, a second set of ground vehicle measurements was made.

(7) The aircraft was positioned so that it could be landed as closely as possible to the time the last ground vehicle departed the runway. The total cycle time from the beginning of wetting to the final measurement of water depth took approximately 25 minutes.

The above procedure was repeated for each wet landing schedule. The time of each phase of the procedure was recorded so that a time correlation of data with the aircraft landing could be obtained.

5.0 TEST DATA SUMMARY

5.1 Ground Vehicles - The data from Table VII have been plotted in Figures 12 through 18 to ascertain the relationships between the vehicles. DBV data are plotted as 1/SDR to obtain the same level of units as obtained by the other vehicles. The data from the Miles Trailer was interpolated to obtain a value at an arbitrary speed of 50 knots for use in these comparisons. End points on the 1/SDR and Mu scales for each vehicle were used to aid in fairing the data. At the low end a Mu value of zero was used except for the DBV where the unbraked, free roll, distance was used in determining the lowest 1/SDR value. Dry end points correspond to the best demonstrated values for each of the vehicles tested. Data fairings are non-linear except for the two DBV's and fit the trend of data points very well. It can be seen in Figure 19 that the vehicles relate one to the other without regard to measurement precision. The data for the DBV, Mu-Meter and Skiddometer are compared to that obtained during the ICAO tests, Reference 1, and it can be seen in Figure 20 that the trends obtained from the two test programs are similar in the friction coefficient range below 0.5 but are significantly different at higher Mu values. This is due to the fact that dry end points were not used in the ICAO analysis. A non-linear analysis was used in the ICAO evaluation, however, to influence the final line fairings used in Reference 1. The precision of measurement, one vehicle to another, on the Roswell runway is only fair. The two DBV's tested at Roswell have results with a precision of approximately ±7% on a point-by-point basis and two Mu-Meters tested during the ICAO tests show a precision of approximately ±8 percent, which is about the best that can be expected between the same type of vehicles. Precision of the relationships between vehicles of different types, i.e. DBV/Mu-Meter, Mu-Meter/Skiddometer, etc. can be considerably poorer as was shown in Reference 1.

5.1.1 Figure 21 shows the variation in vehicle results with time on the four runway sections tested. A close examination of the data in this Figure also indicates that the data trends of Figures 13 through 18 are non-linear. A similar non-linear trend of DBV/Mu-Meter data was noted in the results obtained from tests conducted by FAA/NASA/USAF in 1972, Reference 2. Figure 22 shows the variation of ground vehicle data with water depth during the October 22, 1973 tests. It may be observed that the DBV tends to better delineate the difference in slipperiness of each of the test section than either the Mu-Meter or Skiddometer.

5.1.2 An alternate view of ground vehicle measurements is contained in Figures 23 through 26, wherein the data obtained in conjunction with aircraft tests are shown. In Figure 23 the two DBV's are compared on a point by point basis and on the basis of an average SDR over the aircraft test section. In the first case the data scatter is of the order of ±7 percent while for the average values the scatter is only of the order of ±3.3 percent. Thus it may be concluded that, over the length of the aircraft test section, the USAF DBV yields the same SDR as the NASA DBV within 7 percent. The USAF DBV used in these tests was a Plymouth Satellite station wagon. It weighed 4580 pounds compared to 5520 pounds for the NASA DBV. Sand bags were added to the USAF DBV to bring its weight up to 5520 pounds for 15 stops and then removed. Varying weight had little effect on the results as can be seen in Figure 23. Figure 24 presents the DBV/Mu-Meter data in their normal measurement modes. It is interesting to note, for the same range of wetness conditions, the spread in the results from each machine are considerably different. The DBV shows a total spread of ±10.7 to ±11.8 percent whereas the Mu-Meter shows a total measurement spread of ±33 to ±34 percent. Further, the data indicate a linear relationship on this plot confirming that the fairing in Figure 13 should be non linear. Figures 25 and 26 show the relationships between the DBV and the Miles Trailer and the BV-11-? Skiddometer respectively. It may be observed that the runway test section friction spread about the mean for the wetness conditions experienced are, in alphabetical order:

DBV	±10.7 to ±11.8 Percent
Miles Trailer	±16 to ±21 Percent
Mu-Meter	±33 to ±34 Percent
Skiddometer	±18 to ±23 Percent

5.2 L-1011 - A summary of pertinent test conditions and results for the L-1011 is shown in Table VIII. A total of 55 tests were completed, four of which were controllability tests. The remainder encompassed 26 dry runway landings and 25 wet runway landings. Of these, 3 wet and 15 dry landings were utilized to obtain data for only the air and transition segments. The remainder included braking to a full stop. The full stop tests included maximum antiskid braking on all runs. Of the full stop tests, 8 stops used two engines in reverse and 4 stops used only one engine in reverse. During these tests the target rate of sink at touchdown was 3 feet per second. Test results varied from 1 to 5.5 feet per second. The mean value for all the L-1011 tests was 2.86 with a one standard deviation of ±1.03.

5.3 B-737 - A summary of pertinent test conditions and results for the B-737 is shown in Table IX. A total of 29 tests were completed. All but two tests included all three landing segments. One included air and transition segments and one was for the air run segment only. Fifteen dry runway tests were included. Of the total, 16 were conducted with one engine in reverse. For the remainder, the engines were at idle forward thrust. The target rate of sink at touchdown was 3 feet per second. Test results varied from 1 to 5.2 feet per second. The mean value for all the B-737 tests was 2.51 with a one standard deviation of ±1.11.

5.4 Fifteen water depth measuring stations were established over the length of the test runway as is shown in Figure 11. The first eight stations were used during the aircraft tests. The water depth data obtained during the aircraft tests are summarized in Tables X and XI for the L-1011 and B-737 respectively. In order to simplify the use of the data, the recorded times of measurements at each station were averaged to produce the times shown in Tables X and XI. The data were then plotted in two ways. Figures 27 and 29 show the overall average water depth plotted as a function of time with the aircraft landing time marked. These plots yield the average water depth that the aircraft experienced during the landing. Figures 28 and 30 show the data for the points to the left and right of the runway centerline plotted versus time. The ground vehicle run times are noted on each plot so that the average water depth along the vehicle path may be determined. These data also provide information necessary to adjust the ground vehicle friction data to the time of the aircraft landing by use of the following relationships:

DBV

$$SDR_{AC} = SDR_1 - \frac{(T_{AC} - T_1)}{(T_2 - T_1)} (SDR_1 - SDR_2) \qquad (1)$$

Where SDR_{AC} = Average DBV Stopping Distance Ratio at Time of Aircraft Landing.

SDR_1 = Average of three DBV SDR's During Run Before Aircraft Landing.

SDR_2 = " " " "After "

T_1 = Time of First DBV Run.

T_2 = Time of Second DBV Run.

T_{AC} = Time of Aircraft Landing.

MU-METER, MU-METER, SKIDDOMETER

$$\mu_{AC} = \mu_1 + \frac{(T_{AC} - T_1)}{(T_2 - T_1)} (\mu_2 - \mu_1) \qquad (2)$$

where: μAC = average ground vehicle friction coefficient at time of aircraft landing. The μ values of the Mu-Meter and Skiddometer are the average values realized over the test section obtained at a constant speed of 40 mph. The μ value of the Miles Trailer is the average values of points taken from 85 to zero knots over the test section.

$\mu 1$ = Average ground vehicle friction coefficient during run before aircraft landing.

$\mu 2$ = Average ground vehicle friction coefficient during run after aircraft landing.

T_1 = Time at first ground vehicle run.

T_{AC} = Time of Aircraft Landing.

T_2 = Time of second ground vehicle run.

Finally, Tables XII and XIII present a time oriented tabulation of the average water depth data and average ground vehicle friction data for use in comparing the ground vehicle results and in comparing the ground vehicles with the aircraft performance. These tables also define the lanes in which the ground vehicles operated. Changes in lanes were made on October 25, 1973 to provide data from which differences between left and right lanes may be determined. It is to be noted that the BV-11-2 Skiddometer utilized its normal treaded test tire during the B-737 tests. During the L-1011 tests the treaded tire and a smooth tread tire were tested. The smooth tread tire was used in order to eliminate tire tread effects on the wetted surface. In addition, the Miles Trailer used its normal patterned tire, although it has been shown in Reference 7, that there is a significant difference in friction values as measured by the patterned tire and the smooth tire. The average friction coefficients of the patterned tire are higher over the total speed range than those measured by the smooth tire. Further analysis is necessary to ascertain the meaning of these differences when comparing with other vehicles or aircraft.

5.5 Figures 31 through 33 respectively show the variation in aircraft and ground vehicle data with water depth. The aircraft data are shown only for the case where engines were not reversed and the number of data points is insufficient to define a firm pattern. A trend is more pronounced for the L-1011 than for the B-737, but a wider variation of water depth would be necessary to establish a firm trend. The variation of ground vehicle measurements with water depth may be observed in Figures 32 and 33. For the L-1011 tests the Miles Trailer appears to best delineate the differences in the right and left side of the runway. The Skiddometer and Mu-Meter show a significantly larger data scatter than either the Miles Trailer or the DBV.

6.0 ANALYSIS OF THE EVALUATION TESTS.

6.1 General - The aircraft test program was designed to obtain data for each segment of the landing. This encompassed variations in approach speed, approach angle, time of brake application after touchdown and rate-of-sink at touchdown. The detailed aircraft test data are contained in References 3 and 4. Pertinent curves and explanations are contained herein to show the effects of the variables on the aircraft performance. Ground vehicle data has been summarized in paragraph 5, above. Detailed raw test data from which the ground vehicle summaries were made are on file in the FAA and/or are contained in Reference 5.

6.2 Air Run Distance - Air run distance from 50 feet to touchdown has been analyzed as a function of initial approach speed, flight path angle, speed bleed (50 feet to touchdown) expressed as V_{TD}/V_{APP}, and air time from 50 feet to touchdown. Figure 34 shows the L-1011 test results as a variation of air time, Δt_a, with flight path angle and approach speed. These data are cross plotted in Figure 35 for ease in obtaining data for intermediate speeds. The effect of air time on the speed bleed factor or V_{TD}/V_{APP} is shown in Figure 36. The information from Figures 34 - 36 is used to compute the air-run distance as follows:

$$S_A = \frac{(V_{APP} + V_{TD})}{2} \Delta t_a \qquad (3)$$

where S_A = Air distance 50 ft. to touchdown, feet.

V_{APP} = Approach speed at 50 ft. altitude, ft./sec.

V_{TD} = Touchdown speed, ft./sec.

Δt_a = Air time, 50 ft. to touchdown, seconds.

The B-737 aircraft was not tested over as wide an angle range as the L-1011 and the data are such that any speed effects are not readily discernable. Figure 37(a) relates the flight path angle to air time for all speeds tested. Extrapolation of the curve to higher approach angles was accomplished using geometric limits as a guide. The data for the speed bleed factor as a function of air time show considerable scatter. It appears that for air times up to 6.5 seconds there is no appreciable speed bleed effect. Beyond 6.5 seconds air time there is an appreciable effect. Figure 37(b) is used to obtain V_{TD}/V_{APP}.

6.3 Transition Distance - The transition distance from touchdown to the point at which maximum antiskid braking is applied is determined from the data contained in References 3 and 4. Both aircraft utilized automatic wing lift spoilers. The speed from touchdown to brake application is expressed as V_{BA}/V_{TD} and is shown as a function of Δt from touchdown to brake application in Figure 38 for the L-1011 and Figure 39 for the B-737.

Information from these curves is used to compute transition distance as follows:

$$S_T = \frac{(V_{TD} + V_{BA})}{2} \Delta t_{BA} \tag{4}$$

where S_T = Transition distance, touchdown to brake application, feet

V_{TD} = Touchdown speed, ft./sec.

V_{BA} = Brake application speed, ft./sec.

Δt_{BA} = Time from touchdown to brake application, seconds.

An examination of the wheel spin up times on the wet surface at Roswell, N.M. shows that for both aircraft it sometimes can take on the order of two seconds for wheels to reach synchronous speed in the absence of braking. The average test brake application time from touchdown was 1.47 seconds for the L-1011, 1.04 seconds for the B-737 with flaps 40 and 1.56 seconds for the B-737 with flaps 15. Application of brakes prior to the wheels reaching synchronous speed on a wet surface can reduce the overall braking efficiency (Reference 3). Thus, it appears necessary to delay braking on a smooth wet surface until the wheels have reached their synchronous rotational speed. In the cases of the two aircraft tested, a time delay of 2 seconds should be used when the aircraft are landed on a smooth, wet surface having 0.02 inches or more water depth.

6.4 <u>Stopping Distance</u> - The stopping distance segment is the most difficult of the three segments to determine. The stopping distance data were first corrected to zero wind and plotted as a function of WV^2_{BG}, where W = weight in pounds, and V_{BG} = ground speed at brake application in knots. Plots for the two aircraft are shown in Figures 40 and 41 respectively. These plots form the basis for determining the aircraft wet-to-dry stopping distance ratio(SDR). For any particular wet stop the value of WV^2_{BG} is determined and from Figure 40 or 41 the dry stopping distance is obtained from the line faired through the dry data points. The actual wet stopping distance is divided by the dry distance to obtain the SDR. The dry data were obtained for a range of WV^2_{BG} where both W and V_{BG}^2 were varied and the scatter indicates the faired line will represent all reasonable weight and velocity excursions to an accuracy of +10 percent or less. This is normal accuracy for a test of this type.

6.4.1 The next step in the process was to determine the average effective braking friction coefficient, μ_B, for the dry and wet stopping conditions.

The following equation from Reference 6 was used:

$$\mu_B = \frac{\frac{(1.6878)^2}{2S_B g}(V_2 - V_W)^2 + \frac{T_{RMS}}{W} - \frac{C_{D_G} q_{RMS} S_W}{W} - \phi}{1 - \frac{C_{LG}\, q_{RMS} S_W}{W}} \tag{5}$$

where: S_3 = Stopping distance, feet

g = Acceleration of gravity = 32.174 ft/sec^2

V_2 = Brake application speed, KTAS

V_w = Wind Velocity, Kt. (+) Headwind

T_{RMS} = Root mean square value of thrust over the stopping interval, lb.

W = Weight of the aircraft, lb.

C_{DG} = Drag coefficient during ground roll

C_{LG} = Lift coefficient during ground roll

S_w = wing area, ft^2

q = Dynamic pressure, lb/ft^2 at .707 V_2

ϕ = Runway slope (+) uphill.

<u>L-1011</u>

Constants for computing drag and lift.

$$D = \tfrac{1}{2}\ \rho\ S_W\ V_{BA}^2\ \ C_{DG}$$

$$L = \tfrac{1}{2}\ \rho\ S_W\ V_{BA}^2\ \ C_{LG}$$

C_{LG} = -.180

C_{DG} = .232

S_W = 3456 Ft^2

Drag is figured at .707 V_{BA}

V_{BA} = KTAS

$$D = \frac{1}{2}\,(.002378)\ \sigma\ (3456)\ \ (.707\ V_{BA})^2\ (.232)\ (1.6878)^2$$
$$= \underline{1.3574515\ \sigma\ V_{BA}^2}$$

$$L = \frac{1}{2}\,(.002378)\ \sigma\,(3456)\ \ (.707\ V_{BA})^2\ (-.180)\ (1.6878)^2$$

$$= \underline{-1.053195\ \sigma\ V^2_{BA}}$$

$\underline{B-737}$ $C_{DG} = .285$ $S_W = 980\ ft.^2$ $C_{LG} = .242$

$$D = \frac{1}{2}(.002378)\ \sigma\ (980)\ (.707\ V_{B_A})^2\ (.285)\ (1.6878)^2$$

$$= \underline{.472861\ \sigma\ V_{B_A}{}^2}$$

$$L = \frac{1}{2}(.002378)\ \sigma\ (980)\ (.707\ V_{B_A})^2\ (.242)\ (1.6878)^2$$

$$= \underline{.4015171\ \sigma\ V_{B_A}{}^2}$$

<u>For Both Aircraft</u>

$$\frac{(1.6878)^2}{2(32.174)} = 0.0442697$$

The values of μ_B for the dry runway are shown in Figures 42 and 43 for the L-1011 and B-737 respectively. The data were obtained from page 7.6-11 of Reference 3, pages 12 and 13 of Reference 4, and additional calculations by FAA to include the reverse thrust test points. Table XIV presents an example of the μ_B calculation. The RMS thrust values used in these calculations were obtained from computer printout of thrust versus speed included in Reference 3 and 4. As a check of the correlation, calculations for the L-1011 were made using the thrust velocity data of Figures 44 and 45. Calculations are shown in Table XV and the correlation plot is presented in Figure 46 indicating the adequacy of the procedure used. The following equation for stopping distance, from Reference 6, was used:

$$S = \frac{(1.6878)^2\ W/g}{(T_{RMS} - D_{RMS}) - \mu_B\ (W-L_{RMS}) - W\phi}\left[-\frac{1}{2}(V_2 - V_w)^2\right] \qquad (6)$$

where: S = Stopping distance, feet

W = Aircraft landing weight

$g = 32.174\ ft./sec.^2$

V_2 = Airspeed at brake application, KTAS

V_w = Wind velocity, kts. (+ Headwind)

T_{RMS} = Root mean square value of thrust over the stopping interval, lbs.

D_{RMS} = Root mean square value of drag over the stopping interval, lb.

L_{RMS} = Root mean square value of lift over the stopping interval, lb.

ϕ = Runway slope, radians, (+ uphill)

6.4.1.1 Utilizing the aircraft SDR's obtained as described above, the μB_{DRY} faired curves of Figures 42 and 43, and the μB_{WET} values for each of the wet stops, a ratio of $\mu B_{DRY} / \mu B_{WET}$ was obtained and plotted against the SDR in Figures 47 and 48 for the two aircraft. In the case of the L-1011 the data show little scatter and provide a well defined relationship. For the B-737 the scatter is significantly larger but the relationship defined by the faired lines is very close to that of the L-1011. With these relationships established it is a simple matter to utilize the SDR as a parameter in computing wet stopping distances.

6.4.2 During this test program, main gear tires that were naturally worn to an 80% worn condition were used on both aircraft. For the B-737, however, a series of six landings were made with recapped tires having a full tread thickness but with only a 20 percent groove depth, roughly simulating an 80% worn condition. With these tires wheel lockups were experienced on 5 of the 6 landings. In order to determine the magnitude of difference in tire rolling moment of inertia and friction characteristics, NASA agreed to conduct tests at the NASA landing loads track to ascertain such differences. It was considered by all parties that such data might explain why wheel lock-ups were obtained on the manufactured "worn tires" as opposed to no lockups on the service worn tires. Table XVI contains the moment of inertia data and shows that the manufactured tire had a 10.6% higher moment of inertia than the service worn tire. Table XVII presents the friction results for two test surfaces evaluated, one with a texture depth of 0.22 mm and one with a texture depth of 0.14 mm. These data are plotted in Figures 49 and 50 and show that the manufactured tire displays a lower friction value over the speed range for both skid and peak friction levels than the service worn tire. Time required for wheel spin-up after brake release was also determined and Figure 51 shows that the longer spin up time is associated with the simulated worn tire. The difference in friction levels between the two tires is attributable to the fact that the average depth of grooves in the simulated worn tire was approximately one half that of the service worn tire (0.041 inch compared to 0.104 inch). This arises primarily from the deeper outside grooves of the naturally worn tire. The larger average groove depth of the service worn tire suggests a better drainage capability on wet runways than can be obtained with the simulated worn tires. This results in better traction capability during wet runway operations. The combined effects of lower friction and higher rolling moment of inertia of the simulated worn tire contributed to the higher spin-up times.

6.4.2.1 The data obtained by NASA have been compared to the effective braking friction coefficient obtained by the B-737 at Roswell, N.M. Figures 52 through 56 show this comparison for the naturally worn tire and it may be observed that the aircraft braking friction coefficient is only slightly higher than μ_{SKID} and considerably lower than μ_{max}. Figures 57 through 62 present the comparison for the simulated worn tire. Figures 57 shows a similar trend to the naturally worn tire since there were no prolonged wheel lockups on this test. For the remainder of the simulated worn tire tests, however, the comparison shows that, with locked wheels, the effective aircraft braking is lower than μ_{skid}. This is attributed to the low friction associated with rubber reversion in the tire foot print during the flight tests.

6.4.2.2 The data obtained by NASA are based on single-cycle braking tests on the wet track surface to define the μ_{max} and μ_{skid} tire friction boundaries over the test track speed range (0-115 Kts.). The magnitude of the μ_{max} data might decrease slightly under multi-cycle testing. On the other hand, the surface macrotexture of the Roswell, N.M. runway, and of test surface #1 at the track are comparable (0.216 mm for Roswell and 0.22 mm for the track). There is the possibility that the microtexture of the two surfaces are somewhat different but it is believed that the friction coefficients obtained by NASA at their test track are representative of the levels that would be obtained on the Roswell, N.M. runway 03. Thus, the comparisons shown in Figures 52 through 62 are considered indicative of the true test conditions.

6.5 Longitudinal Control - Concorde Special Condition F-20(e), longitudinal control, was evaluated on the L-1011. This requirement calls for sufficient maneuvering capability to obtain a positive and negative 0.5g relative to unaccelerated flight in the landing configuration at scheduled approach speeds and on an approach path angle of -3°. This test was performed with all engines operating and pull ups to 1.56 and 1.59g were conducted without experiencing the stall warning (stick shaker operation or buffet) demonstrating that the requirement is reasonable and attainable on a representative modern jet transport aircraft.

6.6 Comparison of Aircraft and Ground Vehicles - A comparison of the ground vehicle measurements and aircraft stopping performance was made to determine the nature of relationships that exist. An initial comparison utilizes the aircraft SDR index. This is compared directly to the normal ground vehicle friction measurement output as follows:

Vehicle	Output
DBV	SDR
Miles Trailer	$\mu_{DRY}/\mu_{WET} = \dfrac{\text{Area under } \mu\text{/Velocity curve-dry}}{\text{Area under } \mu\text{/Velocity curve-wet}}$
Mu-Meter	Average Mu-Meter reading @ 40 mph
Skiddometer	Average Skiddometer reading @ 40 mph

The BV-11-2 Skiddometer was tested with its normal treaded tire during the B-737 tests and with both the treaded tire and a smooth tread tire during the L-1011 tests.

6.6.1 A summary of time correlated data is presented in Table XVIII. For simplicity the Miles Trailer data is shown as the average μ realized from 85 to 0 knots speed. In addition, $\mu B_{DRY}/\mu B_{WET}$ ratios have been shown for aircraft runs where no reverse thrust was used. These data are explained in para. 6.6.2 below. Table XIX presents a summary of aircraft and DBV data obtained from other test programs. These data have been used to augment the data obtained during the October 1973 tests at Roswell, N.M.

6.6.2 The initial comparisons of ground vehicle test results with those of the aircraft are presented in Figures 63 through 66. In these charts the aircraft SDR has been compared to the ground vehicle normal mode of measurement. There is a good relationship exhibited between the L-1011 and DBV over the SDR range from 1.5 to 2.7. The relationship with the Mu-Meter is also good but there is a lack of information at the lower aircraft SDR values and the Mu-Meter points exhibit a somewhat wider variation than do either the aircraft or DBV. Figure 64 shows the L-1011 comparison with the Miles Trailer and the BV-11-2 Skiddometer. In the case of the Miles Trailer, the μ_{DRY}/μ_{WET} ratio has been used for comparison where the values represent the ratio of the areas under the μ/Velocity curves from a speed of 85 to 0 knots for the dry and wet conditions respectively. The data from Reference 5 was used to determine the ratios. The relationship with the aircraft shows considerable scatter and there is a lack of data at the low aircraft SDR's which makes the comparison incomplete. The DBV line has been imposed as a reference. Since the Miles Trailer used a patterned tread on the test tire for these tests the data are not indicative of values that might have been obtained with a smooth, or bald tread tire. Reference 7 contains some data that shows that a smooth tread tire exhibits less friction on a wetted surface. Data obtained with such a tire would tend to increase the Miles Trailer μ_{DRY}/μ_{WET} ratios and might bring the data closer to that demonstrated by the DBV. The BV-11-2 Skiddometer data shows a significant difference between the data obtained by the smooth and treaded tire. The level of the friction values obtained with this device are higher than for the Mu-Meter, but this is expected since the Skiddometer measures closer to the μ_{max} value. The scatter of the Skiddometer data, for the same range of wetted conditions, is somewhat less than that exhibited by the aircraft, when the smooth tire data alone is considered.

6.6.2.1 The data for the B-737, in Figures 65 and 66, show much the same trends for DBV and Miles Trailer as was shown for the L-1011. In the case of the Mu-Meter, however, the data shifted to a lower Mu-Meter reading for a comparable aircraft SDR. The data obtained from the Skiddometer using the treaded test tire matches that from the L-1011 tests. Thus, three of the four vehicles each show a basic relationship with the two aircraft. Figure 67 is presented to summarize the DBV and Mu-Meter results obtained for the L-1011 and B-737 and to show how these two aircraft/ground vehicle relationships compare to results obtained from previous test programs involving aircraft and ground vehicle friction measurements. It may be observed that there is a similar and close relationship between 4 of the 5 aircraft tested with the DBV whereas only 2 of the 4 aircraft show the same relationship to the Mu-Meter. The theoretical aircraft braking efficiency, η , lines shown on this chart are related to a μ_{max} value for a low friction wet surface and have been obtained from a current NASA/FAA digital computer simulation study. This comparison indicates a considerable reduction in braking efficiency of the aircraft as the wet runway surface exhibits lower friction values.

This trend is confirmed by the data previously shown in Figures 52 through 56 wherein the aircraft effective braking friction coefficient was shown to be closer to the level of μ_{skid} than to μ_{max}.

6.6.2.2 The results of the aircraft/ground vehicle comparisons from the L-1011 and B-737 tests indicate that further analysis should be made to investigate alternate methods of comparison. This will have to be accomplished at some later time in order not to delay the timely issuance of this report.

7.0 APPLICATION OF RESULTS

The preceding paragraphs have presented the pertinent L-1011 and B-737 flight test data obtained during the Concorde Landing Requirement Evaluation Tests. References 3, 4 and 5 contain considerably more detail and will remain on file at the FAA for future use. There remains the task of examining the effects of the Concorde landing requirement on the two aircraft tested and to indicate any changes that may be necessary to the Concorde requirement itself.

7.1 The initial procedure used to establish reference landing distances and scheduled runway lengths for the L-1011 and B-737, using the Concorde landing requirement as a basis, is based on the following assumptions:

$V_{min} = V_{S_{1g}}$

$V_{REF} = V_{APP} = 1.3\ V_{S_{1g}}$ and $1.3\ V_{S_{1g}} + 10$ kts. (Abuse condition)

Initial flight path angle, $\gamma_i = -3^o$

Abused " " ", $\gamma_a = -2^o$

Time delay from touchdown to brake application = Δt_{BA} = 2 sec.

N-1 engines in reverse during stop.

These assumptions are based on the facts that (1) there is no V_{min} comparable to the V_{min} obtained on the Concorde delta wing configuration, (2) the initial approach angle of 3^o is consistent with current Category III approach criteria, and (3) the observed wheel spin-up characteristics on a smooth wet concrete runway for the two aircraft tested indicated that a minimum of two seconds is required to assure a wheel spin-up to synchronous speed before brakes are applied. The reduced data presented in previous paragraphs have been used to calculate the values of air-run, transition, and stopping distance for a range of landing weights. The three segments are then combined to establish the reference landing distances. Application of the abuse flight path angle, higher approach speed and a 15 percent increase in the stopping distance segment in accordance with the Concorde requirement in Reference 8 (and Appendix I) result in the scheduled landing field lengths.

7.2 Table XX contains the calculated distances for the L-1011 which are then graphically exhibited in Figure 68. The data are compared to the current FAA approved landing field lengths to ascertain the effects of the Concorde landing requirement approach on current swept wing transport landing performance. It is observed that for the L-1011, the reference dry field length is somewhat longer than the current certification distance, but the scheduled dry field length is shorter than the currently approved values. For the wet case, an aircraft SDR of 2.0 was used to define the wet runway condition. For this condition the reference wet landing distance is comparable to the current dry field length and the scheduled wet field lengths exceed the currently approved lengths by 150 feet at the lightest weight and 600 feet at the maximum weight.

7.3 Table XXI contains the calculated distances for the B-737 which are then plotted in Figure 69. There are apparent differences between the trends shown in the L-1011 chart. Upon investigation it was found that the approved Flight Manual data utilized lower values of μ_B than were obtained during the tests at Roswell. Thus Figure 69 does not compare, on an equal basis with the L-1011. Certification air and transition data were then obtained from Boeing for use in preparing data for a better comparison. Figure 70 shows the certification stall speed, V_{S_0}, as a function of weight. A speed bleed factor of .9648 applied from 50 ft. altitude to touchdown, a Δt_{BA} of 0.54 seconds, and a speed bleed factor of V_{BA}/V_{APP} = 0.9526 were used to obtain the brake application speed. These data have been combined with the values of μ_B obtained at Roswell, N.M. to prepare Airplane Flight Manual (AFM) type curves for comparison to the Concorde requirement. Table XXII presents the calculations and Figure 71 shows the comparison. It is observed that the data now follow the same trend as for the L-1011. In the case of the B-737, however, the scheduled dry field length is slightly greater than the AFM field length. In the case of the wet runway, aircraft SDR = 2.0, the scheduled wet landing field is some 900 feet greater than the AFM value at 100,000 pounds gross weight. Obviously this would impose a severe penalty on the B-737. Examination of the data shows that if, for the dry runway, the Δt_{BA} = 0.54 sec. had been used in place of the 2 second value, the scheduled dry field length would have been equal to or less than the AFM value. In the wet case, however, a reduction in approach speed and possibly other modifications would be needed to reduce the scheduled wet field lengths. It should be noted, however, that the wet field length determined using the Concorde requirement with the initial assumptions is only 700 feet longer than the currently approved wet field length at 100,000 lbs. The large difference evident from the B-737-200 advanced is due to the higher dry values of μ_B and the current FAR factors wherein significant reductions in wet field lengths can be obtained when $\mu_{B_{DRY}}$ values are increased. This is misleading, however, since performance on smooth, wet, slippery surfaces is not significantly improved as is evidenced by the low level of friction that was actually achieved. See Figures 52 through 56.

7.4 Examination of the L-1011 and B-737 comparisons of AFM feild lengths with those determined using the Concorde landing requirement shows that there need be no penalty to current swept wing jet transports on a dry runway. In fact scheduled field lengths using N-1 engines in reverse could be shorter than current values. For the wet runway case, since the same speed and approach angle abuses are applied, it seems apparent that the current FAA operating rule factor of 1.15, applied to the total distance from 50 feet to full stop is not sufficient to account for runways whose wet friction characteristics permit an aircraft SDR = 2.0.

7.5 Before examining alternatives and suggested changes to the Concorde requirement the relationship between the DBV and the two aircraft needs to be put into perspective. The key relationships to be considered are Figures 47, 48, 63, and 65. Figures 47 and 63 are combined in Figure 72 and Figures 48 and 65 are combined in Figure 73. From Figures 72 and 73 the aircraft stopping distances on wet runways may be related to the DBV. As an example, a DBV SDR = 2.08 corresponds to an L-1011 SDR = 2.0 which in turn gives a $\mu B_{DRY} / \mu B_{WET} = 2.4$. Entering Figure 42, the value of μB_{DRY} is obtained from which μB_{WET} may be determined. Using the value of μB_{WET} thus derived, the stopping distance may be calculated using equation (6). Test data gathered over the past several years has shown that the accuracy of both aircraft and DBV data under closely controlled test conditions is ±10% each. Combining these accuracies, the RSS value is 14%. Examination of Figures 63 and 65 show that this order of combined accuracy, indeed, exists. It was this fact, which was determined from tests in 1968, 1970 and 1971, which prompted the addition of 15 percent to the aircraft test stopping distances for use in establishing scheduled landing field lengths. This factor is called out in the Concorde Special Condition F-18(a)(2).

7.6 A review of the analysis thus far reveals that some specific changes to the Concorde Special Condition are in order. In addition, any future consideration of the Concorde landing requirement concept to changes in FAR 25 should also contain some changes to better represent swept wing type of aircraft.

7.6.1 In general, the Concorde Landing Requirement Evaluation Tests have substantiated the requirement and shown it to be sound and workable. However, the tests did show that some minor changes are needed. The changes, which have been initiated as direct result of the tests are:

F-15(b) Change 2.5 degrees to 3.0 degrees.

F-15(d)(3)(iii) - Change to read - "The rate-of-sink at touchdown shall exhibit a mean value of 3 feet per second with the maximum data point value not to exceed 5 feet per second."

7.6.2 The assumptions used in Paragraph 7.1 to examine the L-1011 and B-737 landing performance in terms of the Concorde landing requirement concept were shown in Paragraph 7.2 and 7.3 to result in scheduled (wet) landing field lengths in excess of current airplane flight manual values. These results were discussed with three U.S. manufacturers of large jet transport aircraft on April 23, 1974. At this meeting the industry representatives requested FAA to re-examine the following items before proposing any changes to the FAR 25 landing requirement:

(1) Reconsider use of V_{S1g} (one "g" stall speed) in view of the possible effect on structural requirements which are based on stall speeds.

(2) Reword the rate-of-sink at touchdown requirement so that the 3 feet per second is a mean value and a value of 5 feet per second would be the maximum value permitted during testing.

(3) It was felt that obtaining air run data at a -2^{o} glide slope was appropriate but the ± 10 knot speed abuse should be re-examined.

(4) A demonstration that the aircraft could be safely landed at V_{ref} -5 knots should be included.

(5) Reconsider brake application delay time. It was agreed that a finite time is required for wheel spin-up on smooth, wet surfaces but it was pointed out that this time can vary due to tire size and inertia characteristics. Automatic braking systems should also be treated.

(6) It was suggested that stopping distance might be treated in terms of a reference distance altered by a factor and show that the abuse conditions fall within such a distance. Otherwise, the test distances would apply in preparing the Flight Manual field lengths.

(7) It was suggested that a cost effectiveness study is needed to evaluate cost penalties to the airplane, to the airport operator for fixing his runways and/or a combination of the two.

7.6.3 All of the above items are under investigation. Preliminary results of initial investigations have led to a new set of conditions which can provide a baseline for future discussions.

For the all engine operating case:

1. $V_{APP} = V_{REF}$ of not less than 1.25 V_{S1_g} and/or 1.25 V_{S1_g} +10 knots, and it shall be demonstrated that an instantaneous 1.56g load factor can be achieved at V_{REF}.

2. Initial flight path angle, $\gamma_i = -3^{o}$.

3. Abused flight path angle for performance, $\gamma_a = -2^{o}$.

4. Time delay from touchdown to brake application shall be that time

demonstrated for main landing gear wheel spin up to synchronous speed on the wet runway used for certification or 2 seconds, whichever is greater.

5. The wet runway used for certification testing should exhibit a DBV SDR of 2.0 or greater when the water depth is between 0.02 and 0.06 inches. The average surface texture depth should be from 0.12 to 0.32 mm. The reference wet surface is defined as one exhibiting a DBV SDR = 2.0.

6. If automatic braking systems are used, it should be demonstrated that the stopping distances obtained using manual techniques with the brake application times of (4) above are not exceeded when the automatic braking system is used. For this purpose the critical thrust reverser is considered to be inoperative and the amount of reverse thrust on the remaining engines shall not exceed that determined in (7) below.

7. Reference landing distances should be predicated on the use of V_{ref} and γ_i. Scheduled landing field lengths should be predicated on V_{ref} +10 knots, γ_a and a 15 percent addition to the stopping distances thus determined. Means other than wheel brakes may be used provided their operation is safe and reliable. The level of reverse thrust should be that which can be controlled, with the most critical engine inoperative, in a 10 knot direct cross wind on the reference wet runway surface. Reference landing distances and scheduled landing field lengths should be determined for both dry and wet conditions.

8. The rate-of-sink at touchdown during landing demonstration tests should exhibit a mean value of 3 feet per second with the maximum for any landing not to exceed 5 feet per second.

9. A controllability demonstration should be conducted to show the airplane is capable of being safely landed under normal conditions where $\gamma_i = -3^{\circ}$, the approach speed in the landing configuration is V_{ref} - 10 knots for all engines operating, and $V_{ref_{-1}}$-5 knots for N-1 engines operating.

10. It should be demonstrated that the airplane can be safely landed from a $\gamma_a = -5^{o}$ at V_{ref}

7.6.4 Using the ground rules delineated in paragraph 7.6.3, reference landing distances and scheduled landing field lengths have been computed for the L-1011 and B-737. Table XXIII contains the computations and figure 74 shows the L-1011 distances compared to current AFM distances. Table XXIV contains the computations and figure 75 shows the B-737 comparison with AFM data. These data reveal:

(1) The touchdown dispersion for the L-1011 is 1252 feet and for the B-737, 1074 feet.

(2) The transition distance dispersion is 61 feet for the L-1011 and 111 feet for the B-737.

(3) The dry stopping distance dispersion for the L-1011 is 1165 feet and for the B-737, 1052 feet. Addition of 15 percent in stopping distance accounts for test inaccuracies.

(4) The wet stopping distance dispersion is 1857 feet for the L-1011 and 1767 feet for the B-737 with the 15 percent factor included.

Since the L-1011 $\mu_{B_{DRY}}$ values obtained at Roswell, N.M. matched those obtained during FAA certification, figure 74 shows the true relationship of distances calculated using the Concorde procedure compared to currently approved AFM landing field lengths. For the B-737, it was pointed out earlier that the μ_B values obtained at Roswell, N.M. were higher than those used for FAA certification. The Roswell values were used to construct figure 71, but in figure 75 the currently approved AFM data is used for comparison with the data calculated using the modified assumptions in the Concorde requirement. It can be observed that application of the Concorde landing requirement, as may be considered for swept wing aircraft, does not penalize the L-1011 compared to currently approved landing field lengths, but does penalize the B-737-200 advanced (See discussion in paragraph 7.3 above). In the case of the L-1011 the new dry landing field length is on the order of 700 feet shorter than current length and the wet landing field length is no worse than the current values except at the maximum weights. The data for the B-737 show a difference in the wet field length and it is evident, as was stated earlier, that current FAR factors do not accommodate surfaces that exhibit a SDR = 2.0. Witness the fact that, with the modified assumptions, the B-737 scheduled dry field length, figure 75, is slightly less than current AFM values. Thus the scheduled wet field length represents the true friction levels utilized in test and is considered more representative of the real conditions than the approved AFM data would indicate. For surfaces more slippery than the reference condition, accountability can be readily established.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The conclusions and/or recommendations resulting from the test program are listed below:

1. From a practical standpoint, there is no consistent or precise correlation between the various ground vehicles.

2. Procedures for obtaining time correlated aircraft stopping performance data and ground friction measurement vehicle data on wet runways have been developed and their adequacy demonstrated.

3. Satisfactory relationships were established between aircraft SDR and $\mu_{B DRY}$ and $\mu_{B WET}$ from which wet stopping distances can be computed.

4. Tests of service worn and manufactured "worn" tires show that the service worn tires exhibit a lower moment of inertia and higher friction over a speed range on slippery surfaces than the manufactured "worn" tires.

5. Three of the four types of ground vehicles used each exhibit its own similar consistent relationship to both aircraft tested.

6. Anti-skid braking system efficiency reduces as runways get more slippery resulting in operation at close to the μ_{skid} level rather than near the μ_{max} level.

7. Further examination of alternate methods of comparing aircraft and ground vehicle relationships are indicated.

8. The Concorde landing requirement evaluation tests have substantiated the requirement and have shown it to be sound and workable.

9. Two changes to the Concorde Special Condition were made as a result of the tests. The initial approach flight path angle was changed from 2.5° to 3° and the rate-of-sink at touchdown was changed to a mean value of 3 ft./sec. with the maximum test data point not to exceed 5 ft./sec.

10. A revised set of assumptions are advanced for discussions relating to possible FAR 25 changes.

11. Using the new assumptions the scheduled wet landing field lengths for the L-1011 and B-737 were calculated and do not impose any significant penalties on the L-1011 but do show a penalty for the B-737-200 advanced for a reference wet runway wherein the DBV SDR = 2.0.

12. Accountability for runways more slippery than the reference condition can be readily established.

13. Results of this test program indicate that discussions should proceed regarding a change to the FAR 25 landing requirement.

14. The DBV was shown to provide a reasonable relationship to the two aircraft tested and its results can be related to the aircraft effective wet braking friction coefficient. Use of the DBV to measure friction characteristics of wet runways is strongly recommended.

REFERENCES

1. Programme for Correlating Equipment Used in Measuring Runway Braking Action, Final Report 2/22/74. (ICAO)

2. Walter B. Horne, Thomas J. Yager, Robert K. Sleeper, Eunice G. Smith and Leslie R. Merritt, Preliminary Test Results of the Joint FAA-USAF-NASA Runway Research Program, Part II - Traction Measurements of Several Runways Under Wet, Snow-Covered, and Dry Conditions with a Douglas DC-9, a Diagonal-Braked Vehicle, and a Mu-Meter. NASA TMX-1051, Sept. 27, 1972.

3. Model L-1011 (Base Aircraft) Landing Performance Report for FAA Evaluation of Concorde SST Special Condition 25-43-EU-12. Lockheed Report - LR26267, January 14, 1974.

4. Model 737 Data - FAA Evaluation of Proposed Landing Certification Rules. Boeing Document No. D6-43078, December 17, 1973.

5. Miles Trailer Data - FAA Evaluation of Proposed Landing Certification Rules. Boeing Document No. D6-43079. November 6, 1973.

6. Proposal for: Evaluation of Proposed Landing Certification Rules of Concorde SST Special Condition 25-43-EU-12. Lockheed Report LR-25818, March 27, 1973.

7. L. Bramhall; "Wet Runway Friction Measurement. A Revised Reference Wet Hard Surface"; Flight Engineering Note No. 7; Issue 1: June 1972. U.K. Civil Aviation Authority.

8. "Special Conditions for the Societe Nationale Industrielle Aerospatiale/ British Aircraft Corporation Concorde Model Airplane"; Special Conditions No. 25-43-EU-12, June 1972.

APPENDIX I

TEST DATA
Figures and Tables

FIGURE I
GENERAL ARRANGEMENT
L-1011

FIGURE 2
SIGNAL BLOCK DIAGRAM
AIRCRAFT INSTRUMENTATION
LOCKHEED L-1011, SHIP 1001

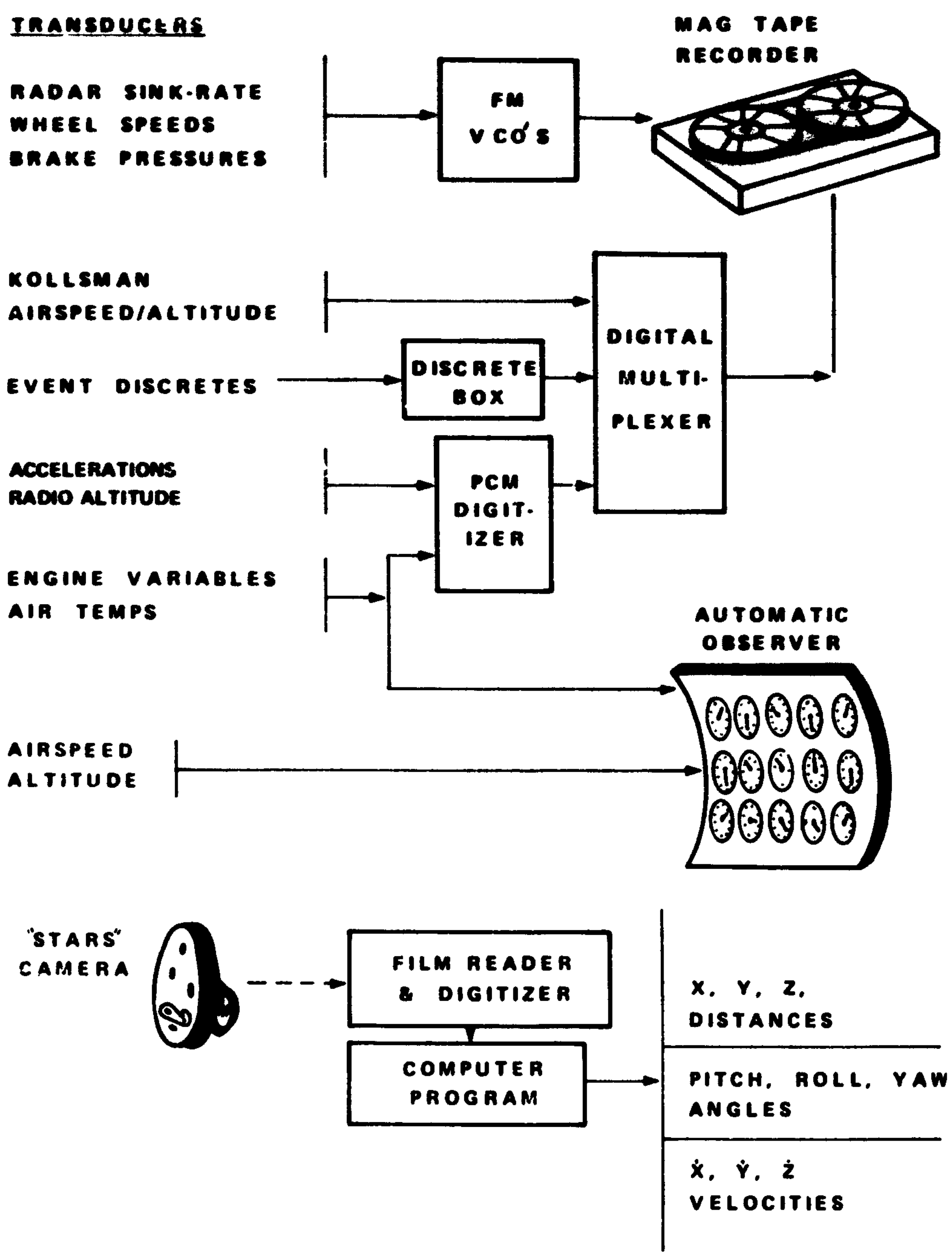


FIGURE 3
GENERAL ARRANGEMENT - B-737

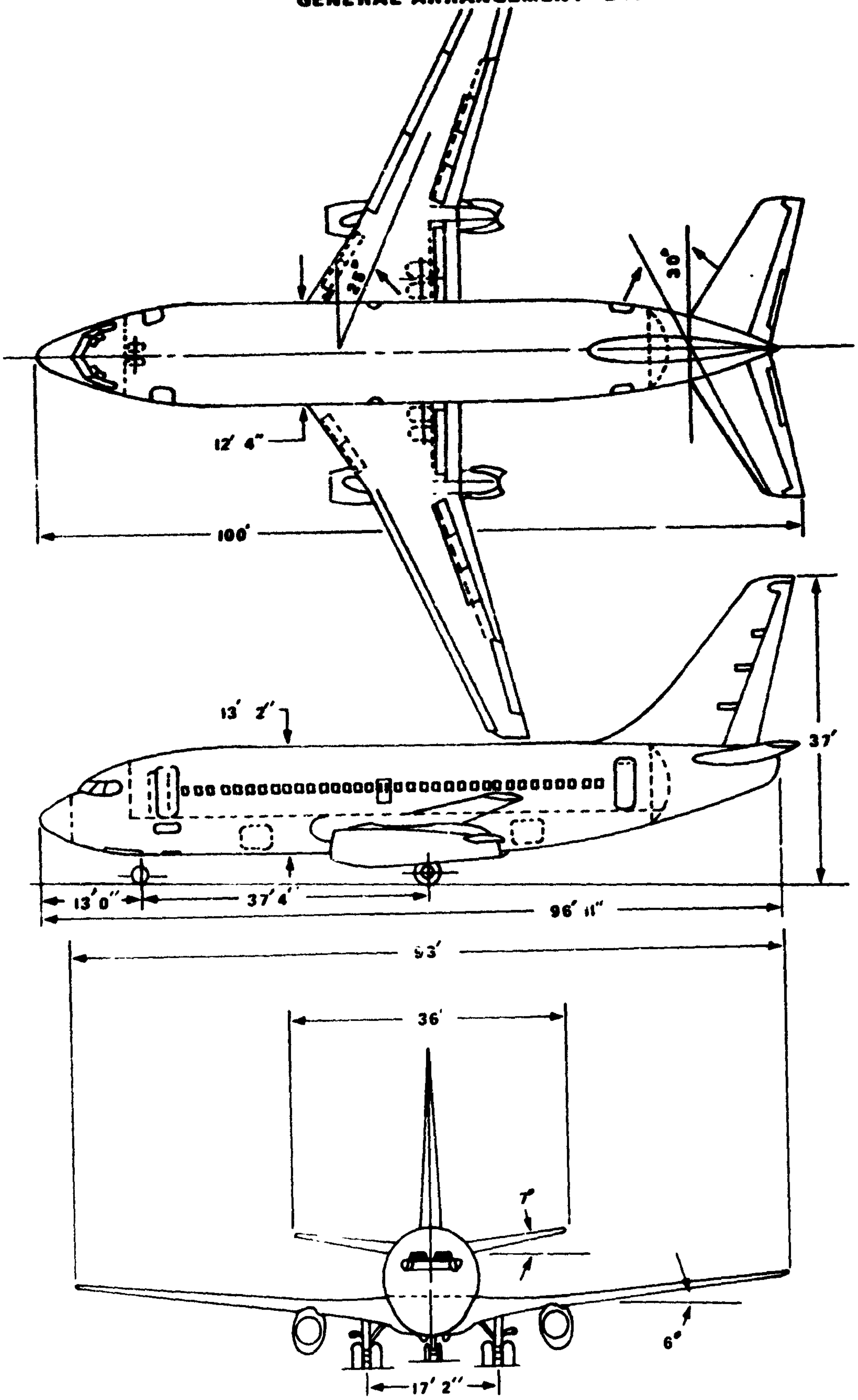


FIGURE 4

AIRBORNE TAPE RECORDING SYSTEM

B-737

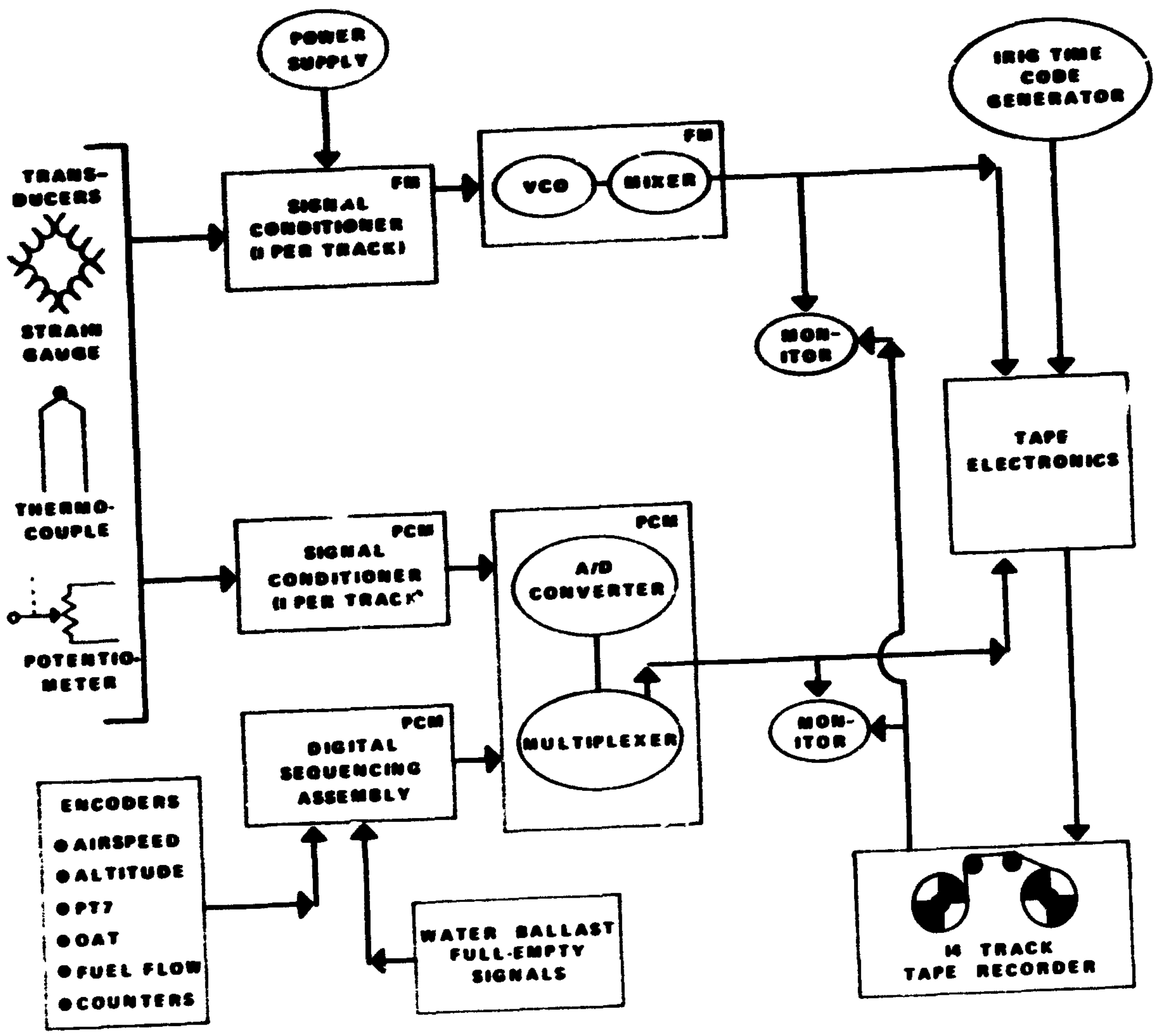


FIGURE 5
WATER TANK TRUCKS USED
FOR WETTING

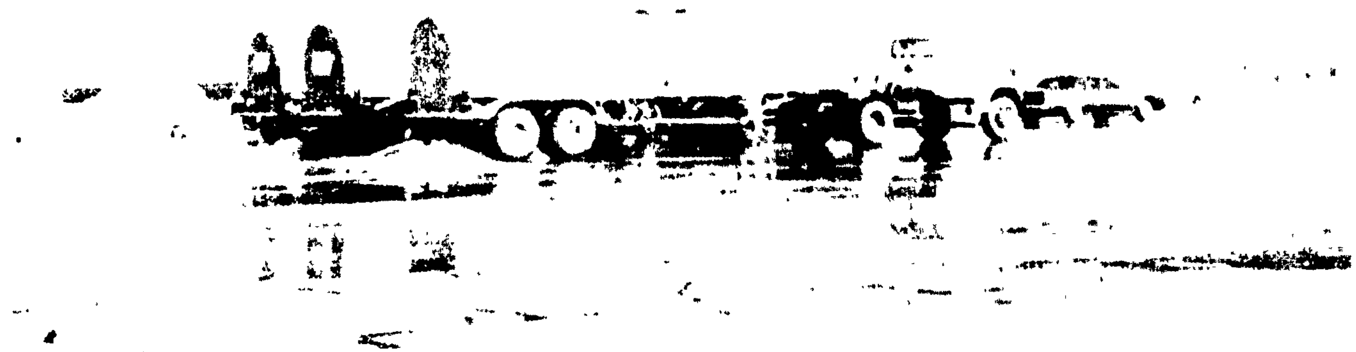


FIGURE 6

GROUND VEHICLES USED IN THE TEST PROGRAM

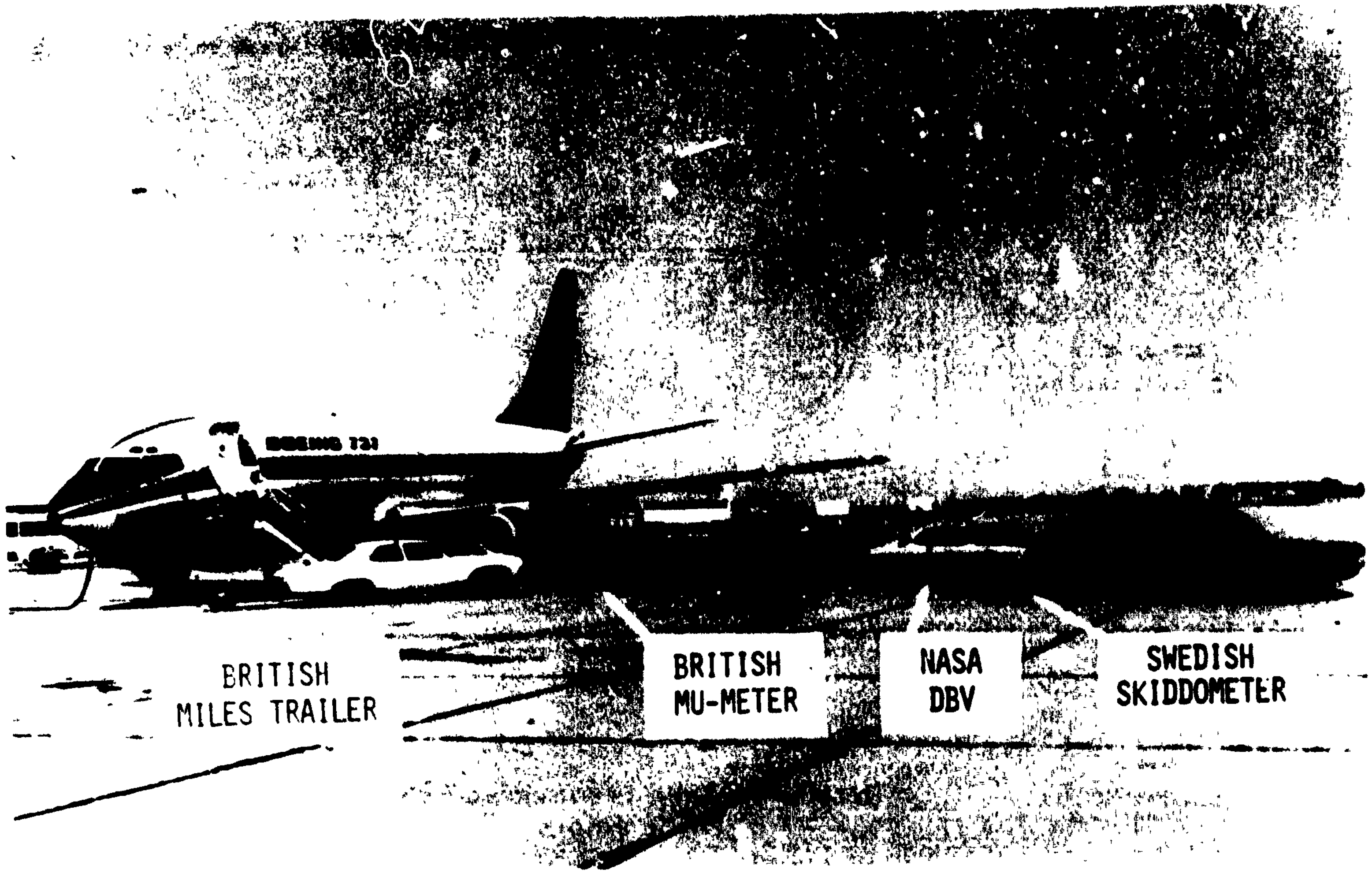


FIGURE 7
DIAGRAM OF DIAGONAL BRAKING SYSTEM

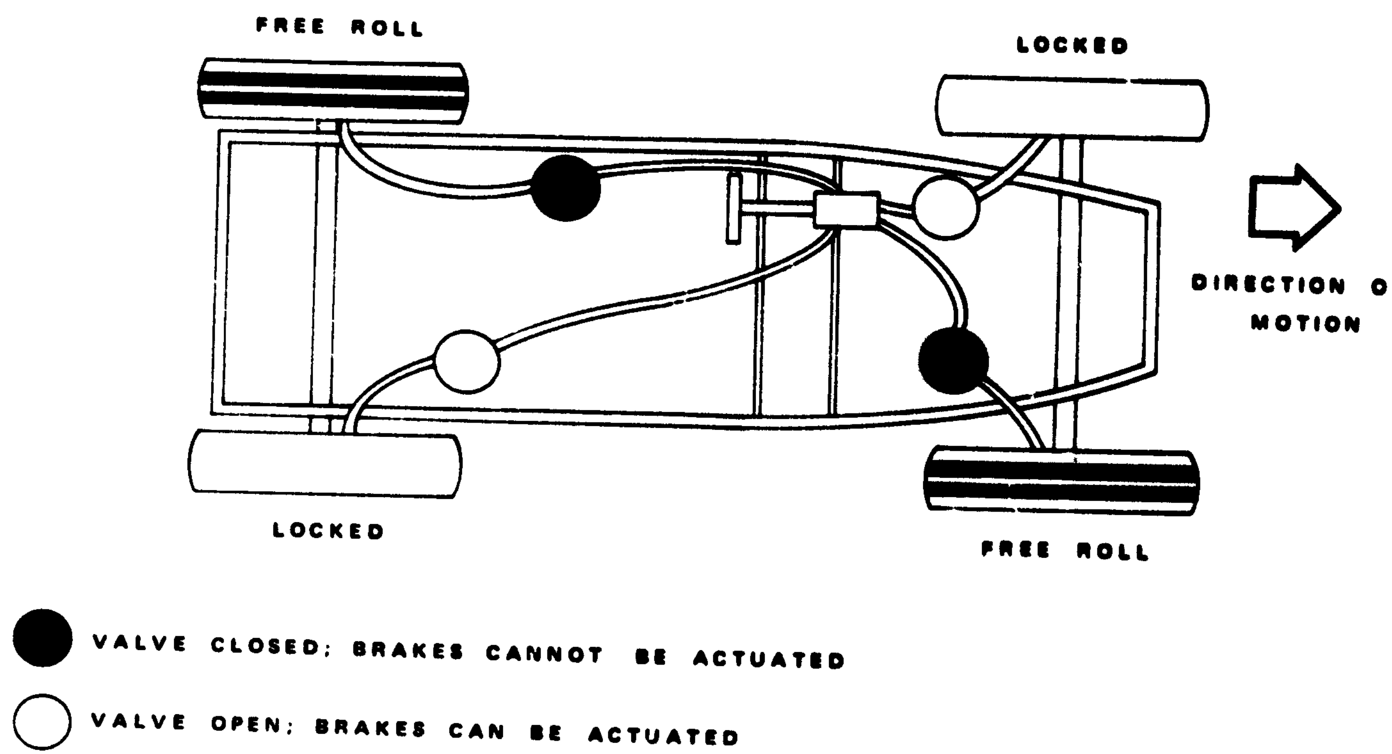
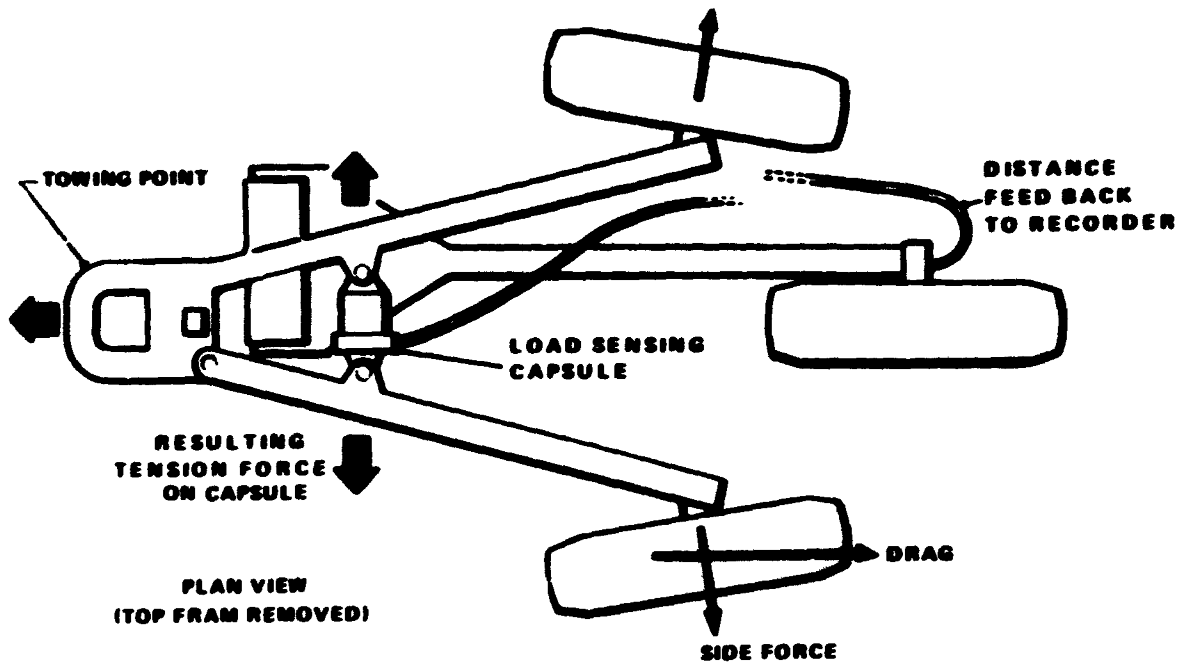
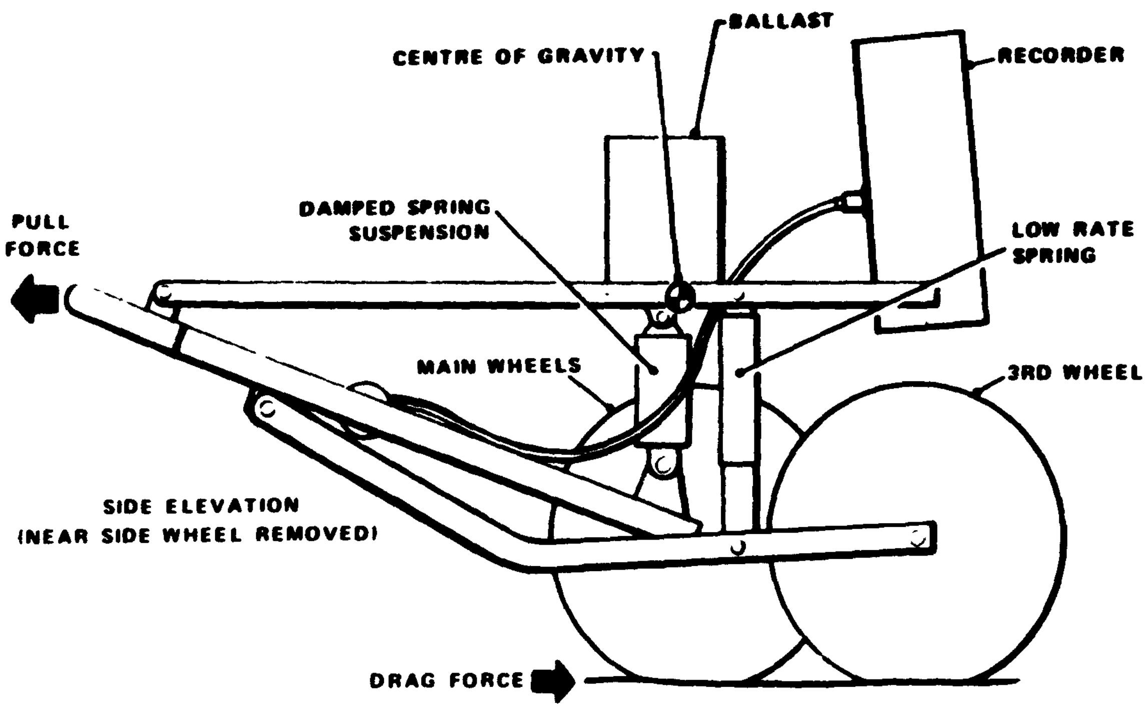


FIGURE 8

DIAGRAMMATIC LAYOUT OF MU METER

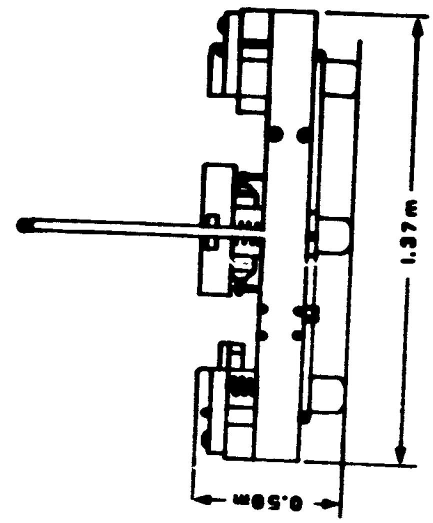


PLAN VIEW
(TOP FRAM REMOVED)



SIDE ELEVATION
(NEAR SIDE WHEEL REMOVED)

FIGURE 9
BV - II - 2 SKIDDOMETER



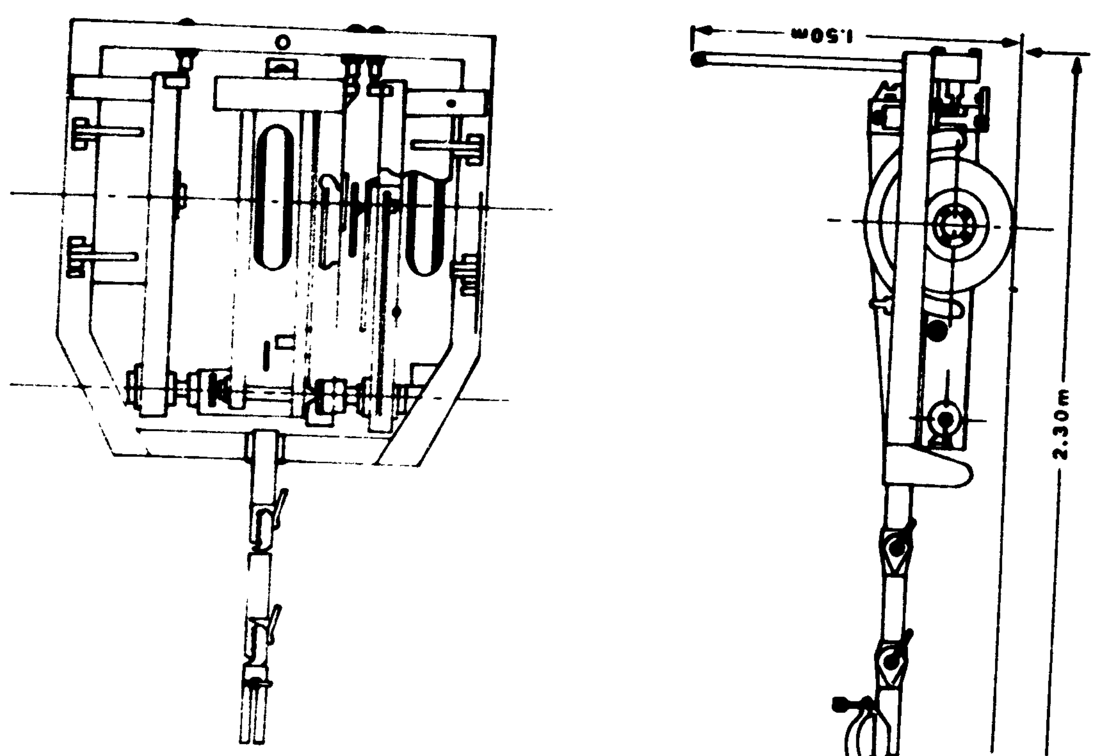


FIGURE 10
MILES TRAILER

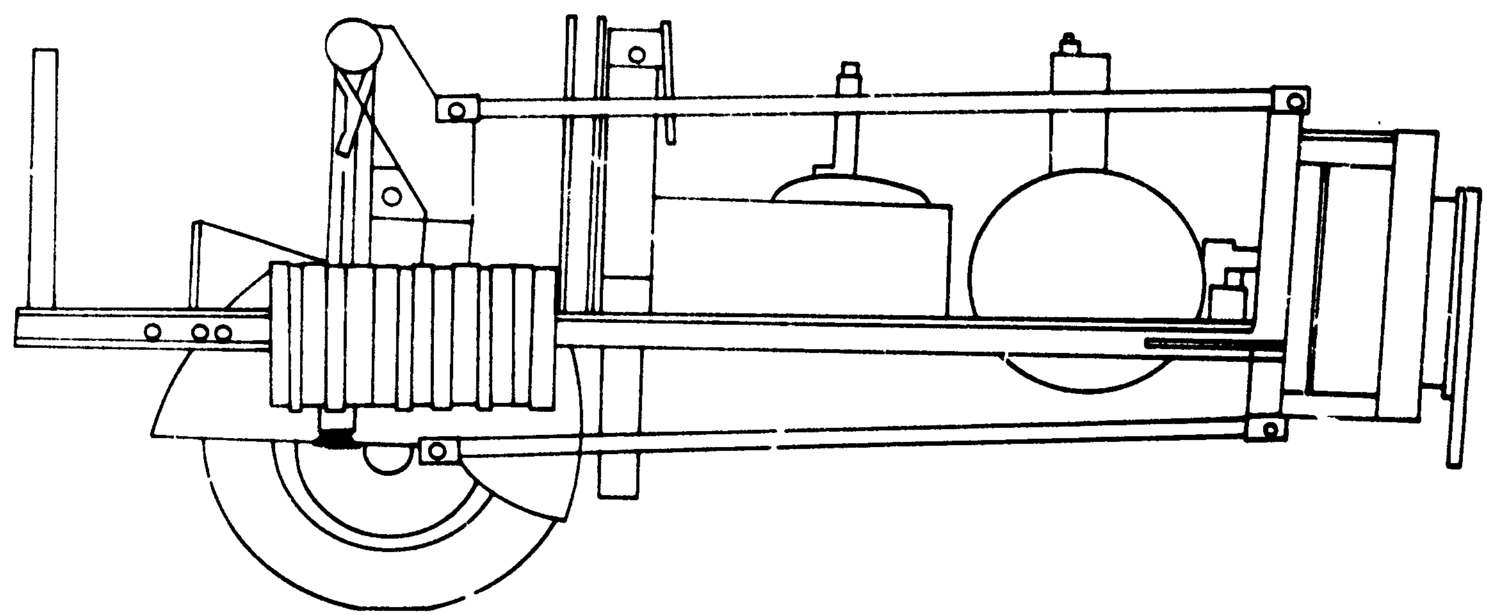


FIGURE II
ROSWELL, N. M. RUNWAY 03 TEST LAYOUT

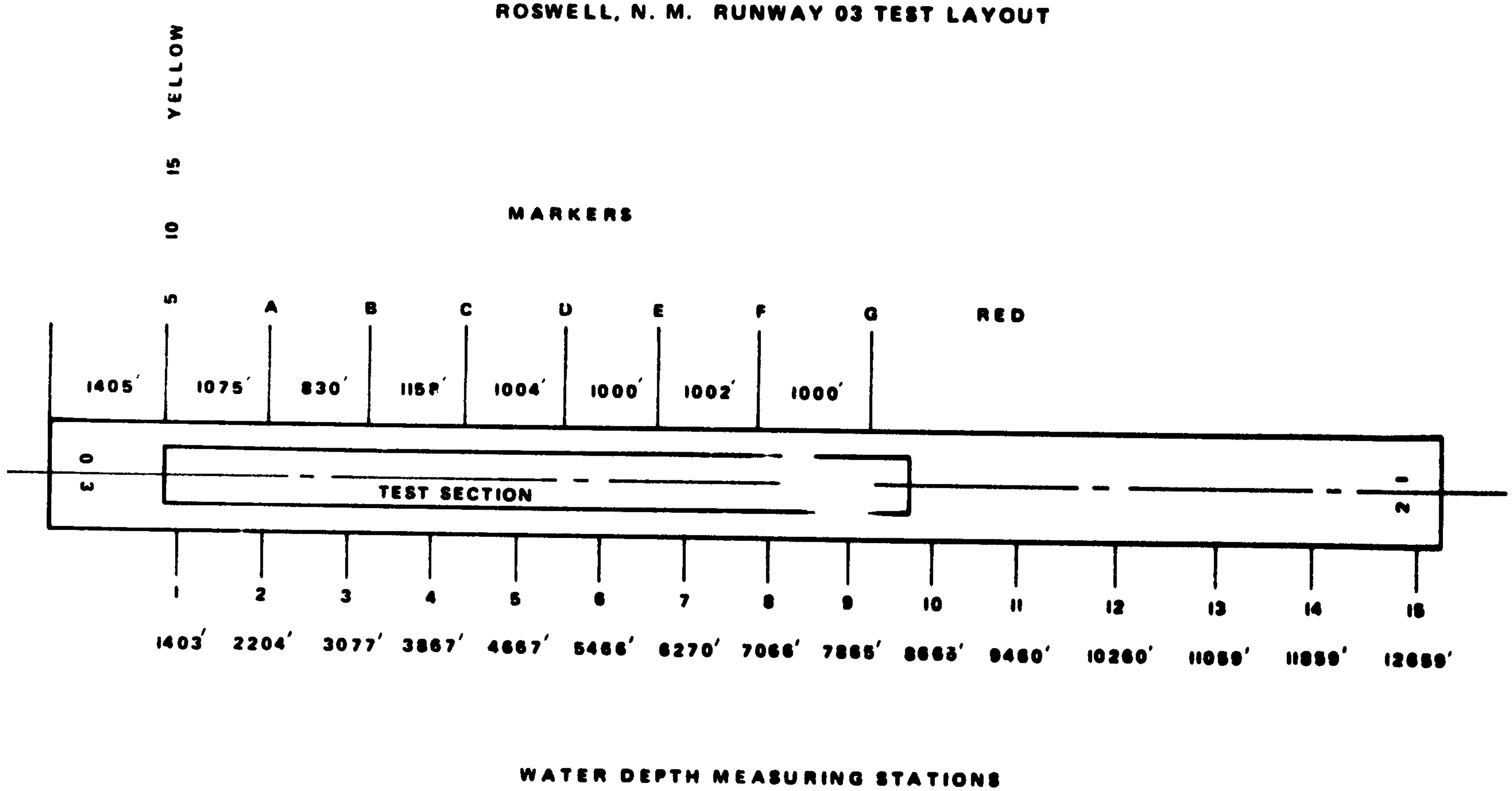


FIGURE 12
NASA DBV AND USAF DBV
RELATIONSHIP ON RUNWAY 03
ROSWELL, N.M.

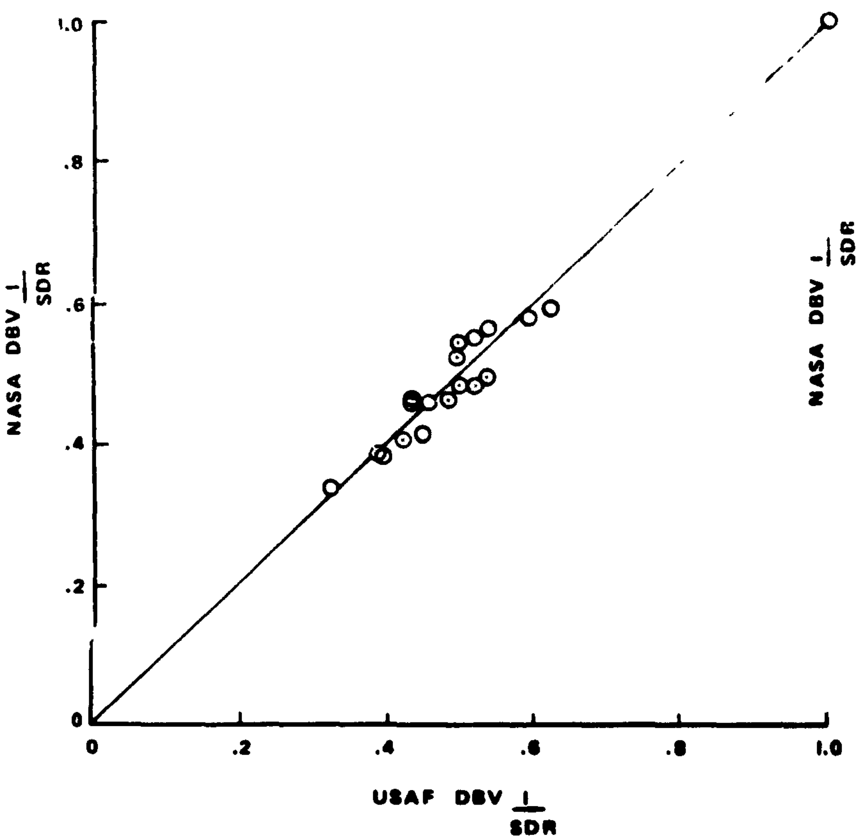


FIGURE 13
NASA DBV AND MU-METER
RELATIONSHIP ON RUNWAY 03
ROSWELL, N.M.

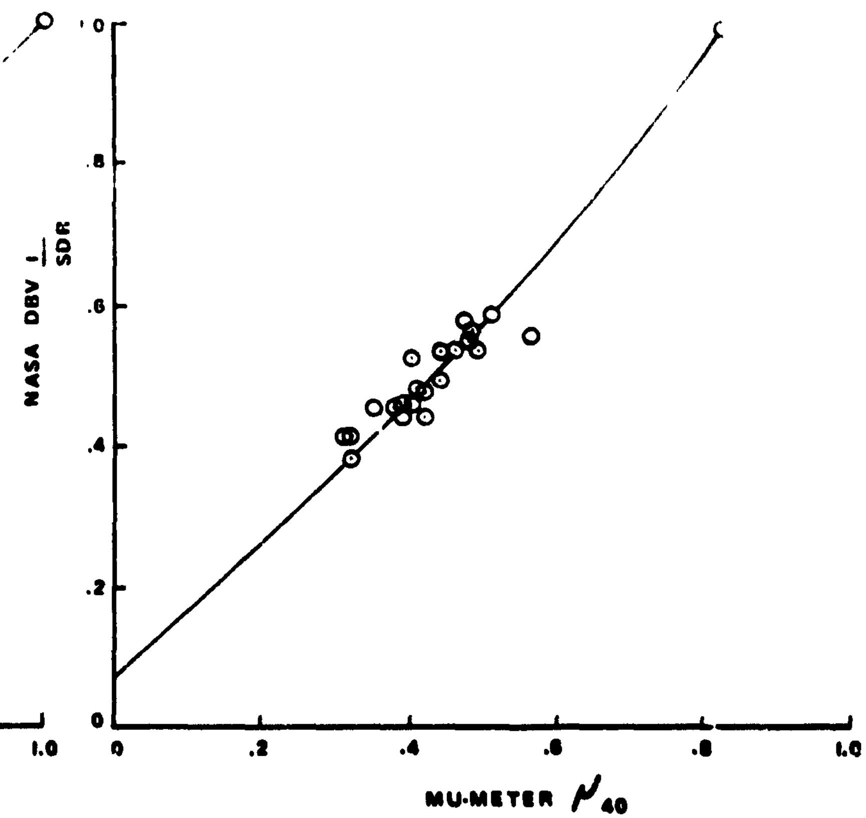


FIGURE 14

NASA DBV AND BV-II-2
SKIDDOMETER RELATIONSHIP
ON RUNWAY 03 ROSWELL, N. M.

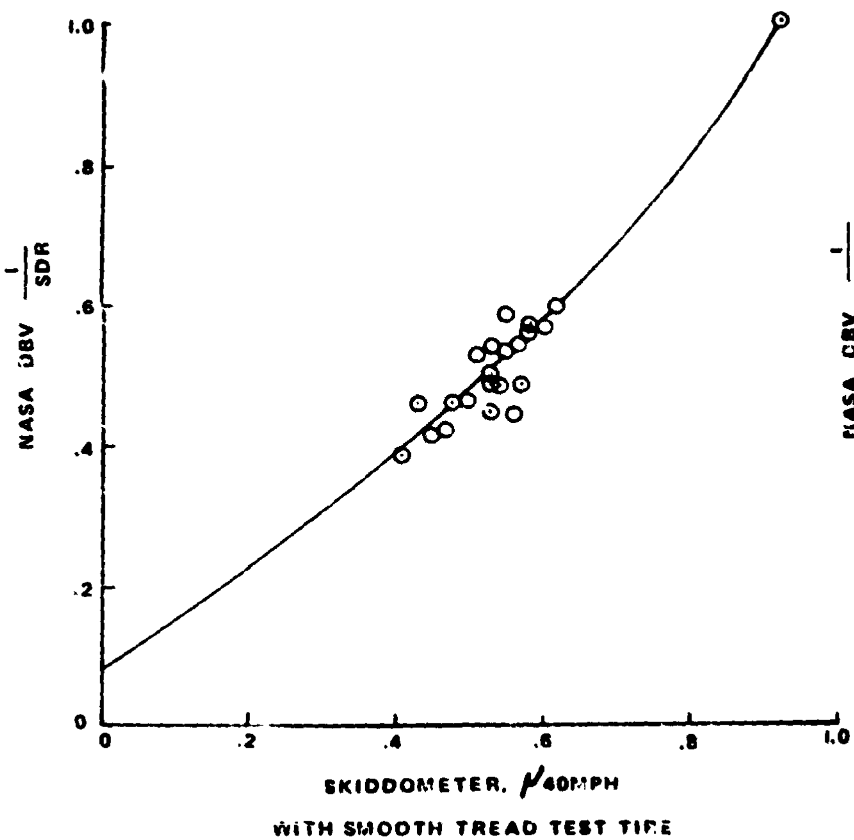


FIGURE 15

NASA DBV AND MILES TRAILER
RELATIONSHIP ON RUNWAY 03
ROSWELL, N. M.

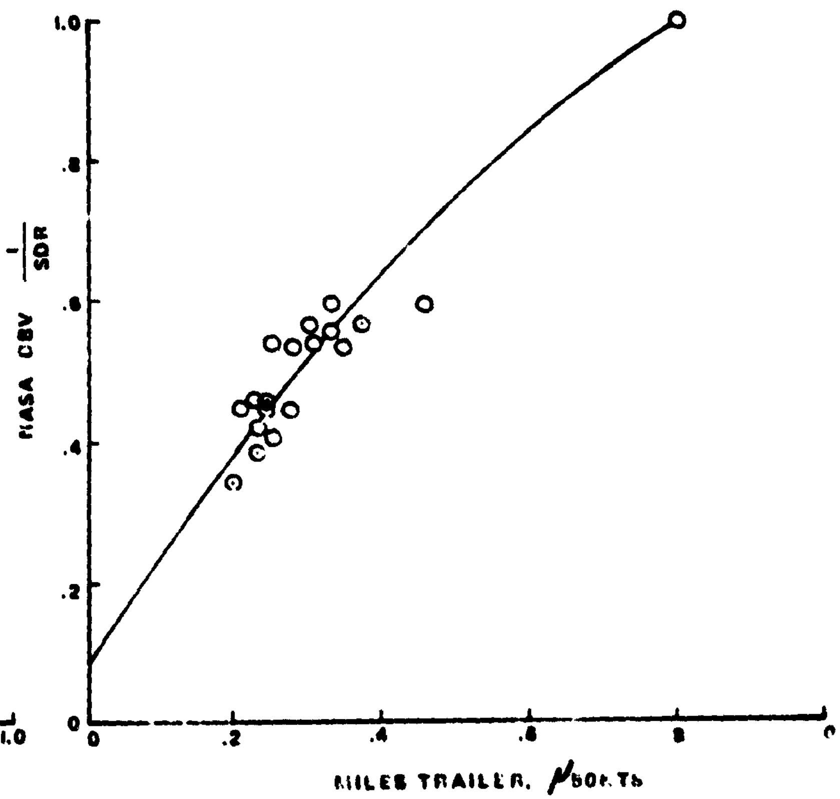


FIGURE 16
MU-METER AND BV-II-2
SKIDDOMETER RELATIONSHIP
ON RUNWAY 03 ROSWELL, N. M.

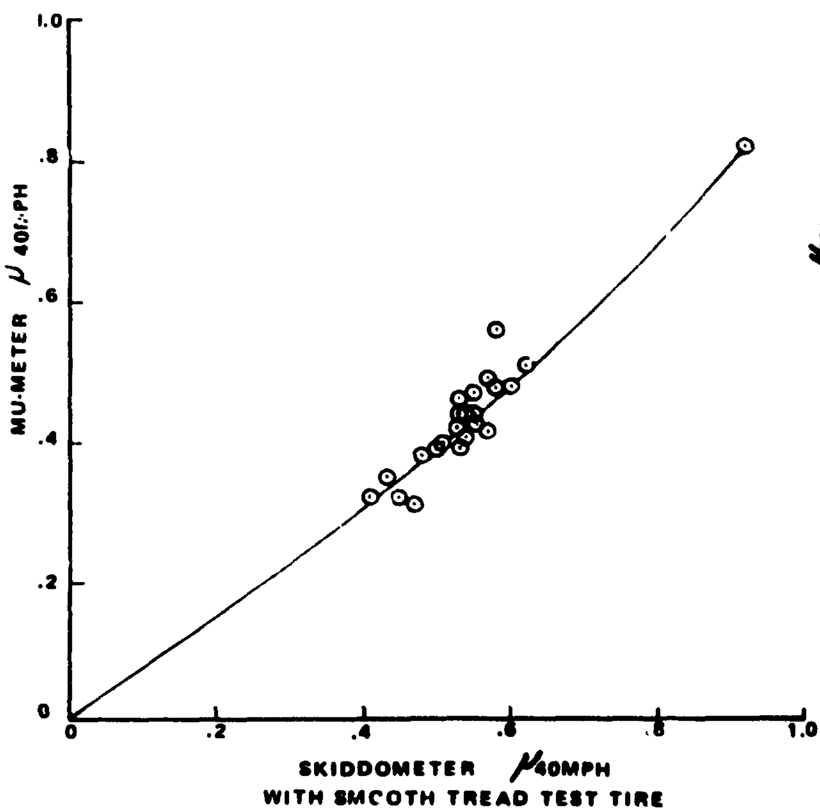


FIGURE 17
MU-METER AND MILES
TRAILER RELATIONSHIP ON
RUNWAY 03 ROSWELL, N. M.

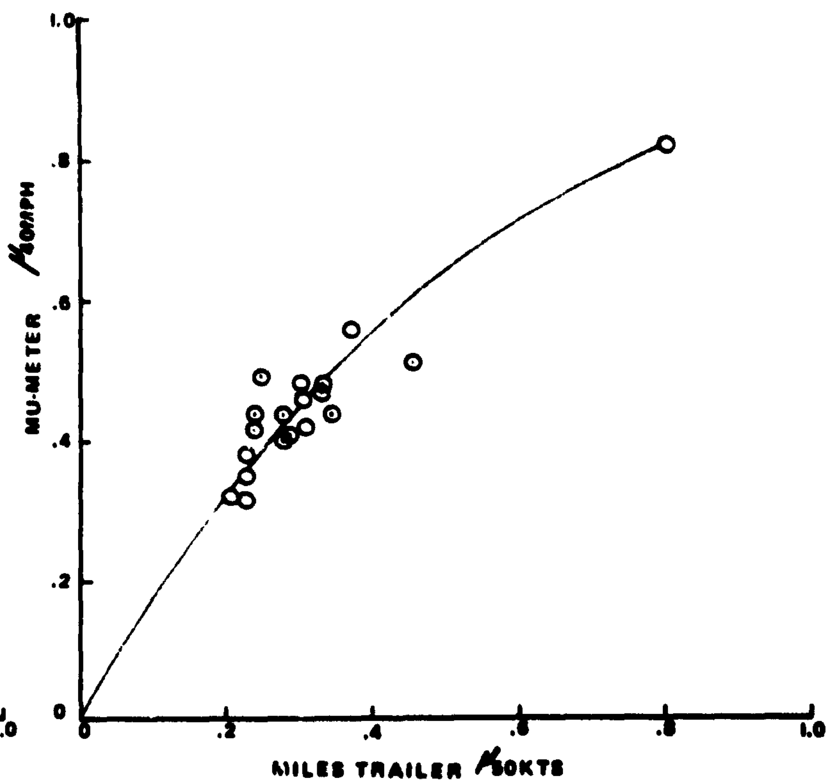


FIGURE 18
BV-II-2 SKIDDOMETER AND
MILES TRAILER RELATIONSHIP
ON RUNWAY 03, ROSWELL, N. M.

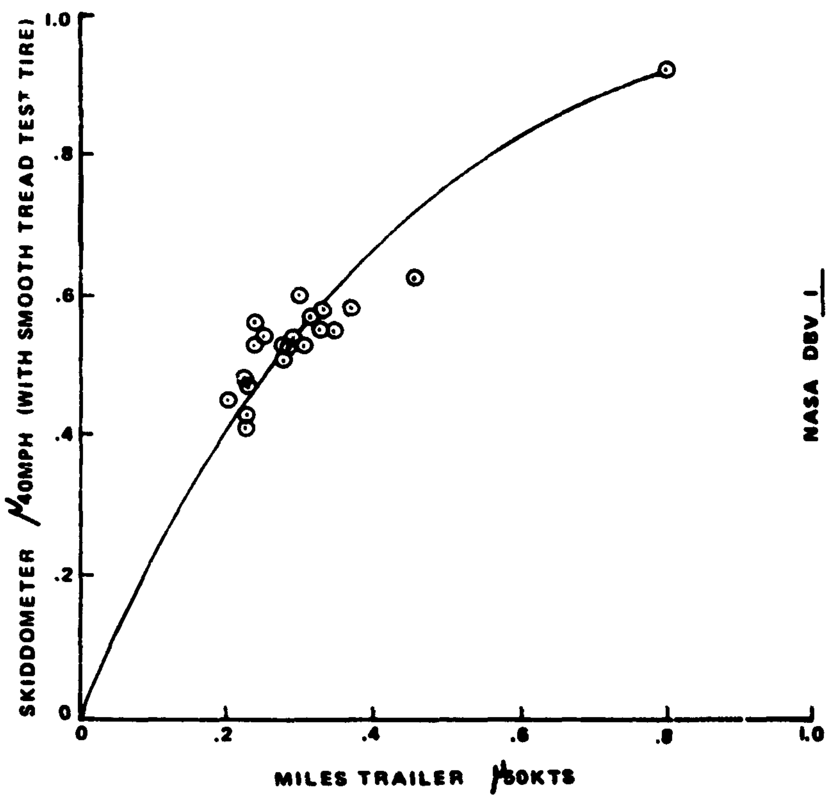


FIGURE 19
GROUND VEHICLE NOMOGRAPH

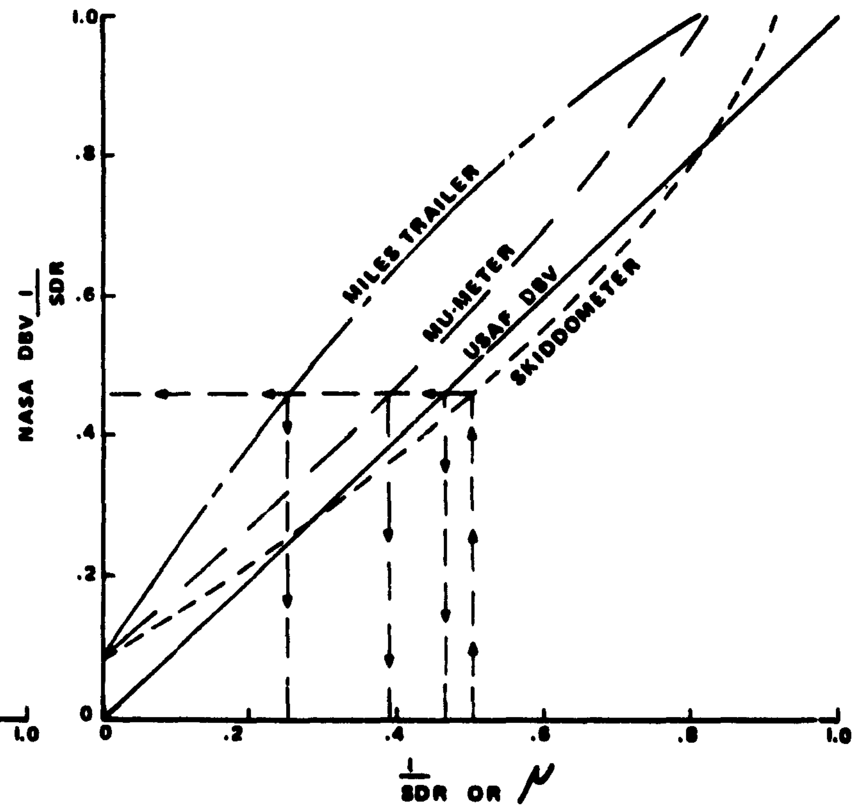


FIGURE 20

COMPARISON OF RELATIONSHIPS BETWEEN THREE FRICTION MEASURING VEHICLES USING RESULTS FROM TWO TEST PROGRAMS

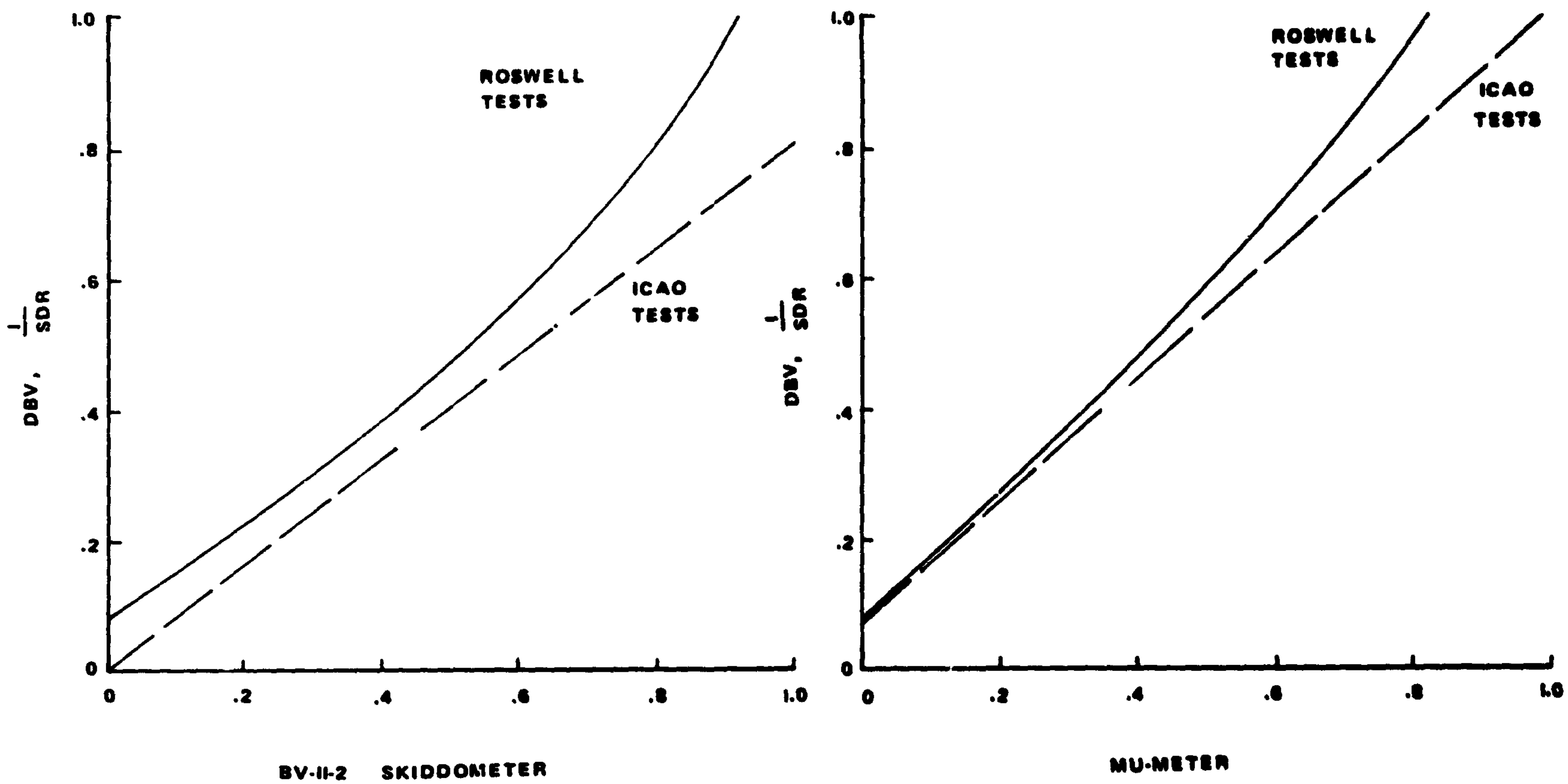


FIGURE 21

GROUND VEHICLE CORRELETION TEST AS A FUNCTION OF TIME-ROSWELL, N.M.

RUNWAY 03 OCTOBER 22, 1973

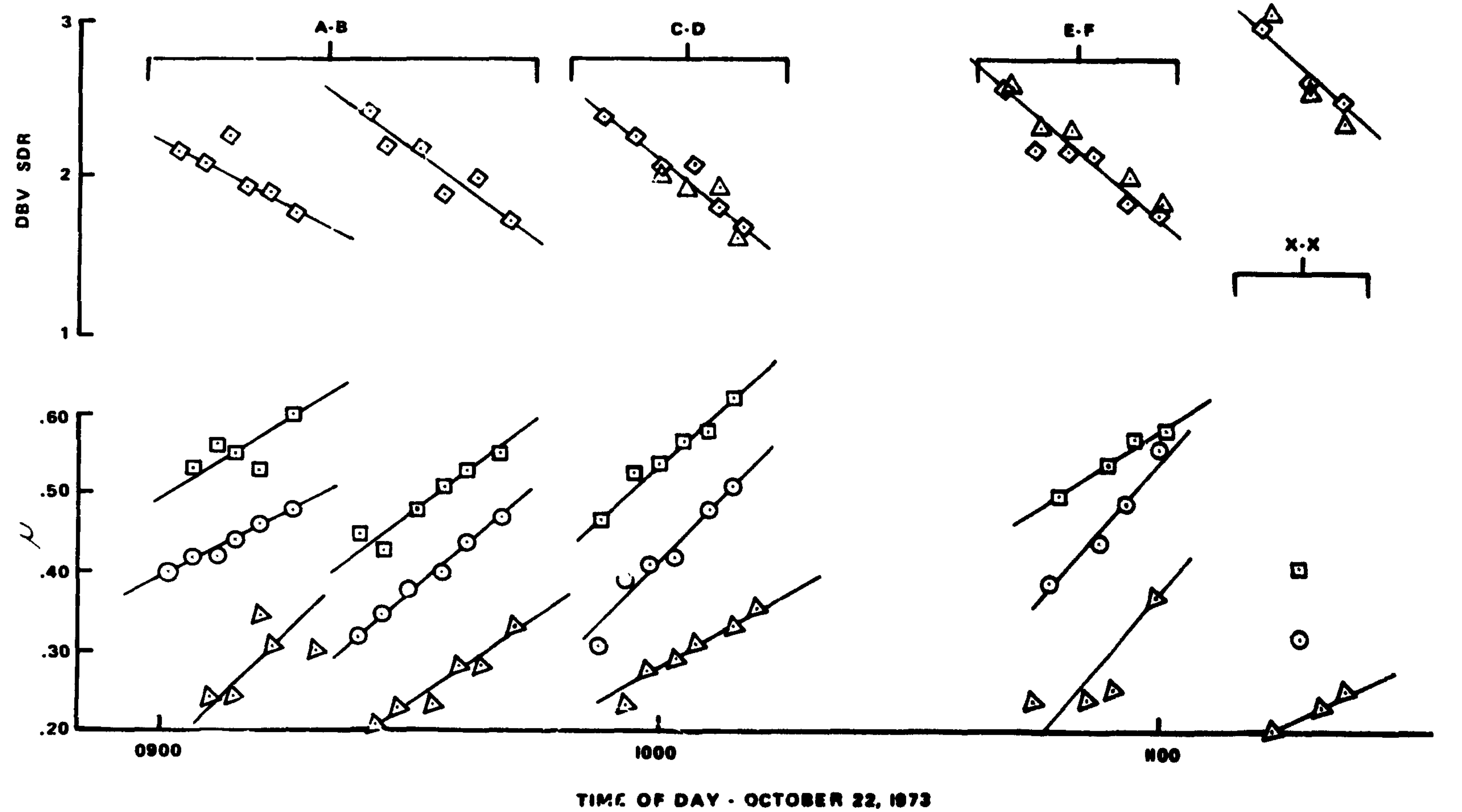


FIGURE 22
GROUND VEHICLE FRICTION MEASUREMENTS AS A FUNCTION OF WATER DEPTH, ROSWELL N.M.
RUNWAY 03 OCTOBER 22, 1973

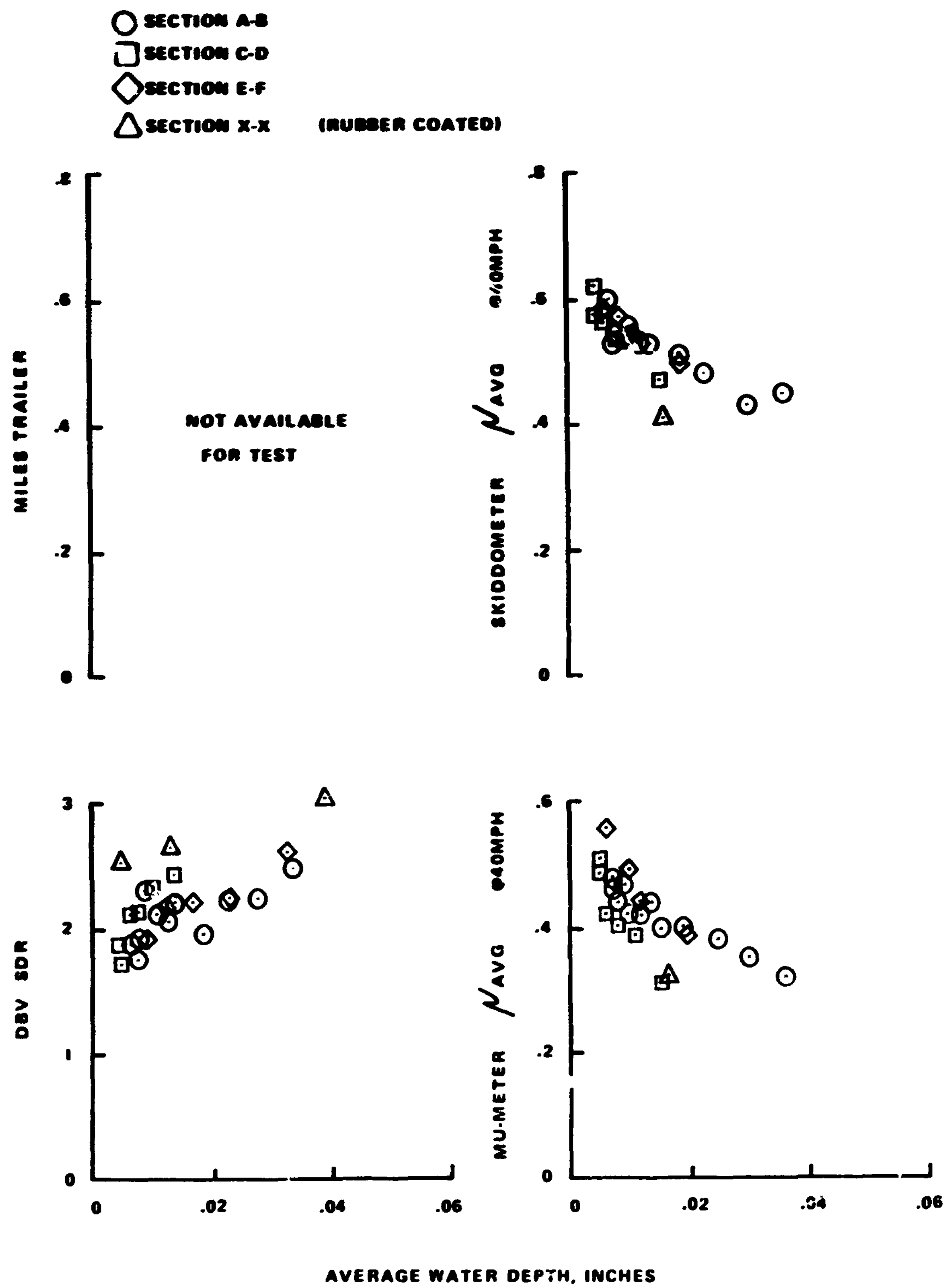
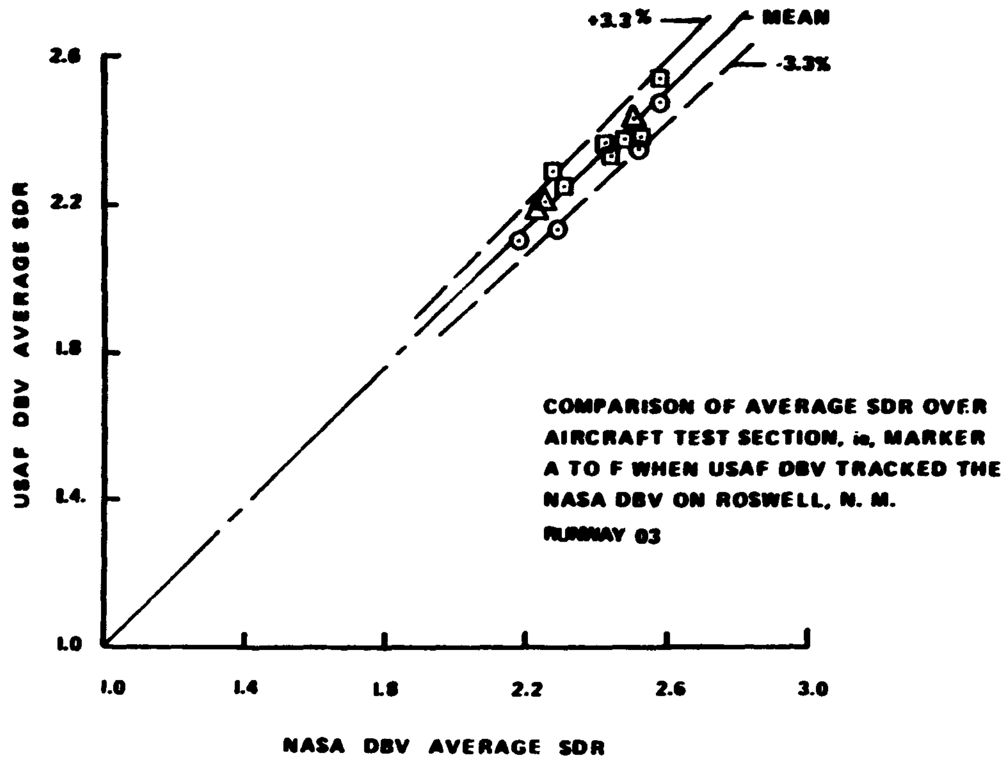


FIGURE 23

COMPARISON OF USAF DBV WITH THE NASA DBV



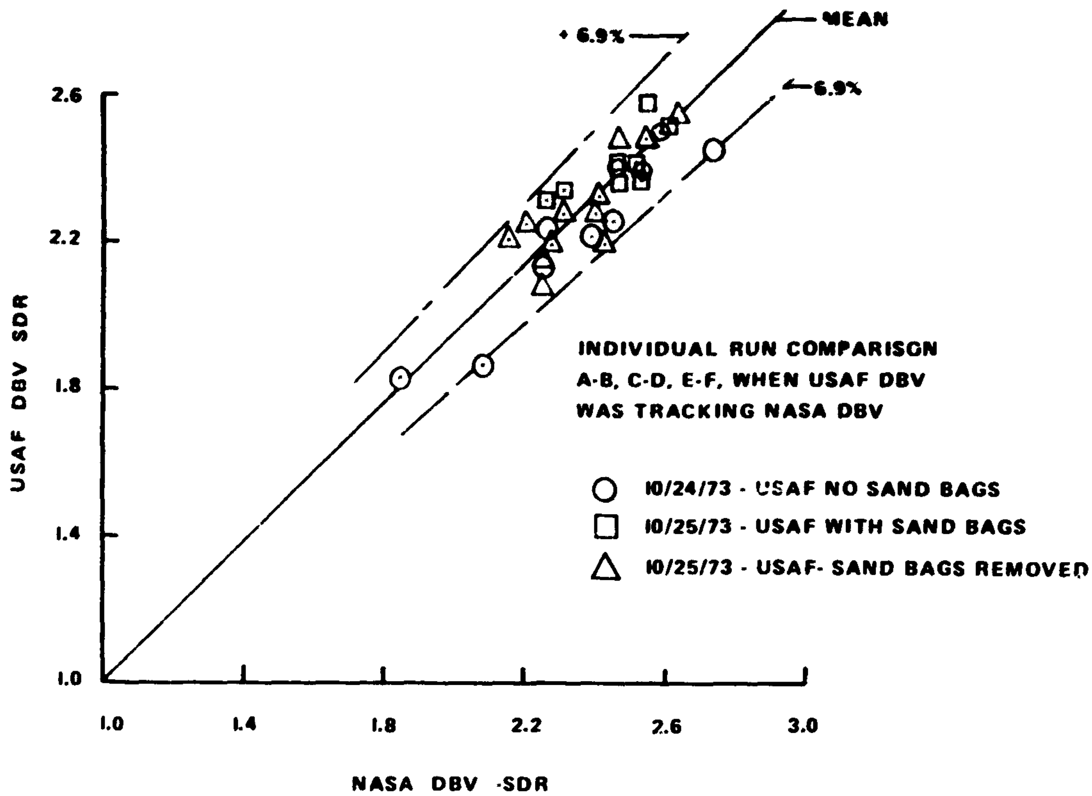


FIGURE 24
COMPARISON OF THE NASA DBV TO
THE MU-METER

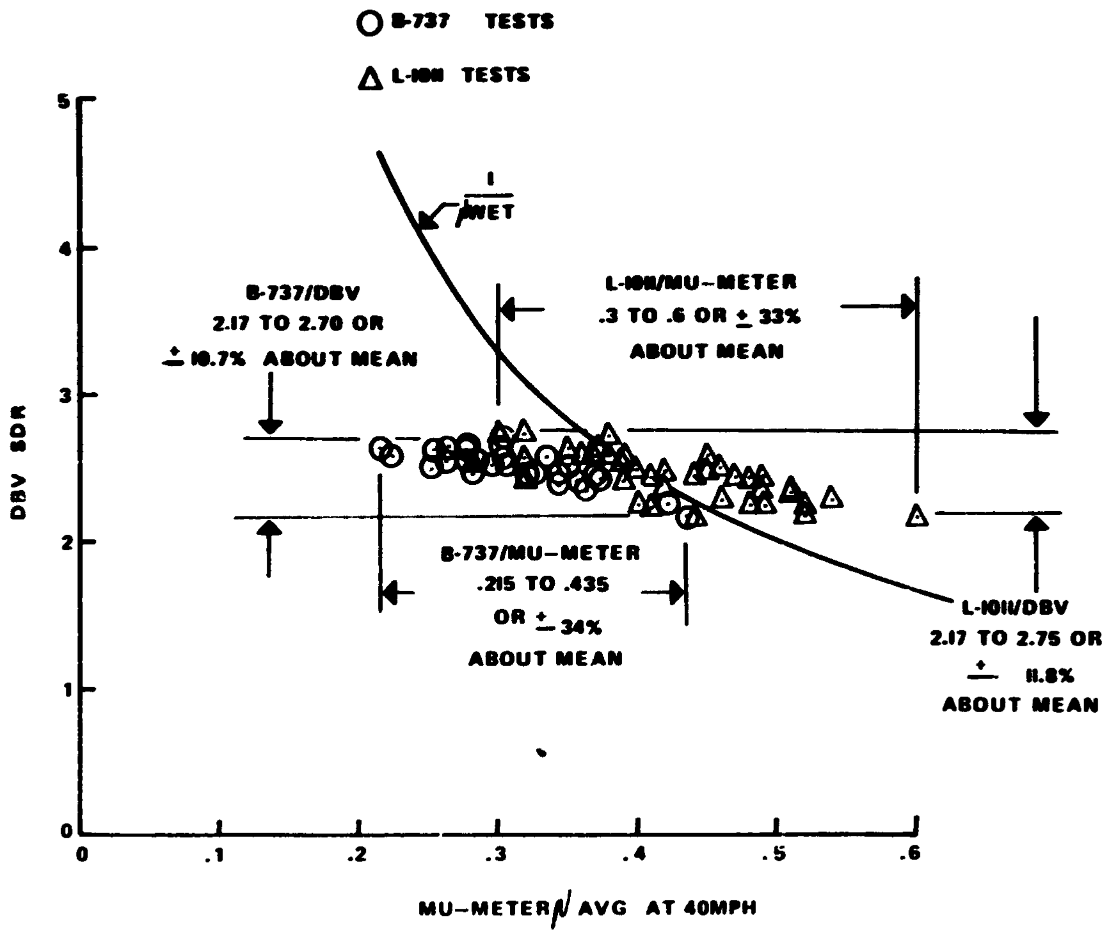
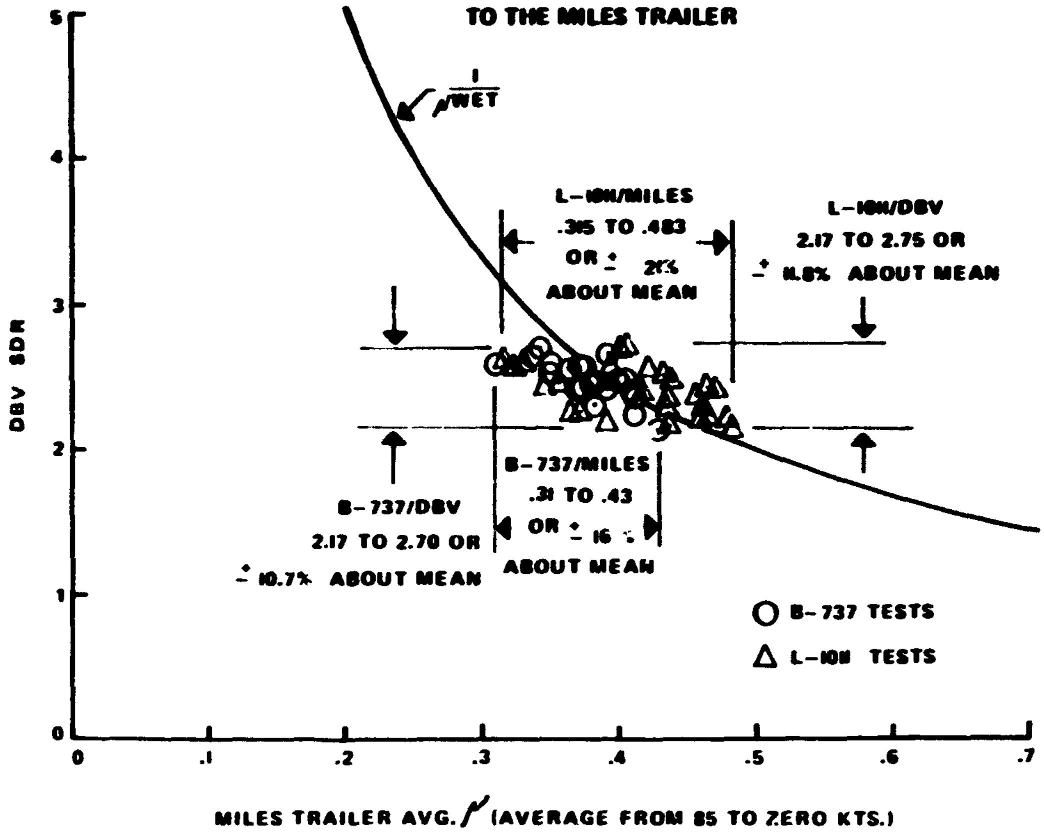


FIGURE 25
COMPARISON OF THE NASA DBV
TO THE MILES TRAILER



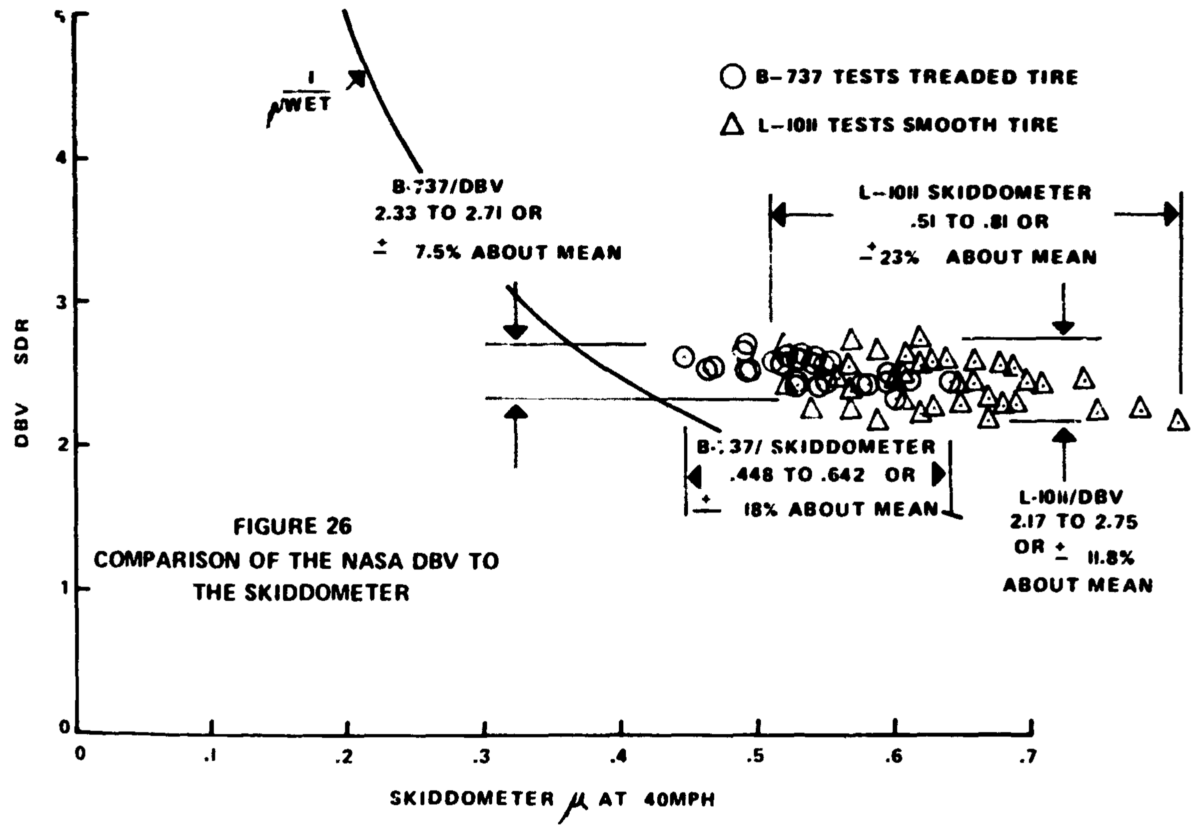


FIGURE 26
COMPARISON OF THE NASA DBV TO
THE SKIDDOMETER

FIGURE 27 (A)

WATER DEPTH AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 24, 1973

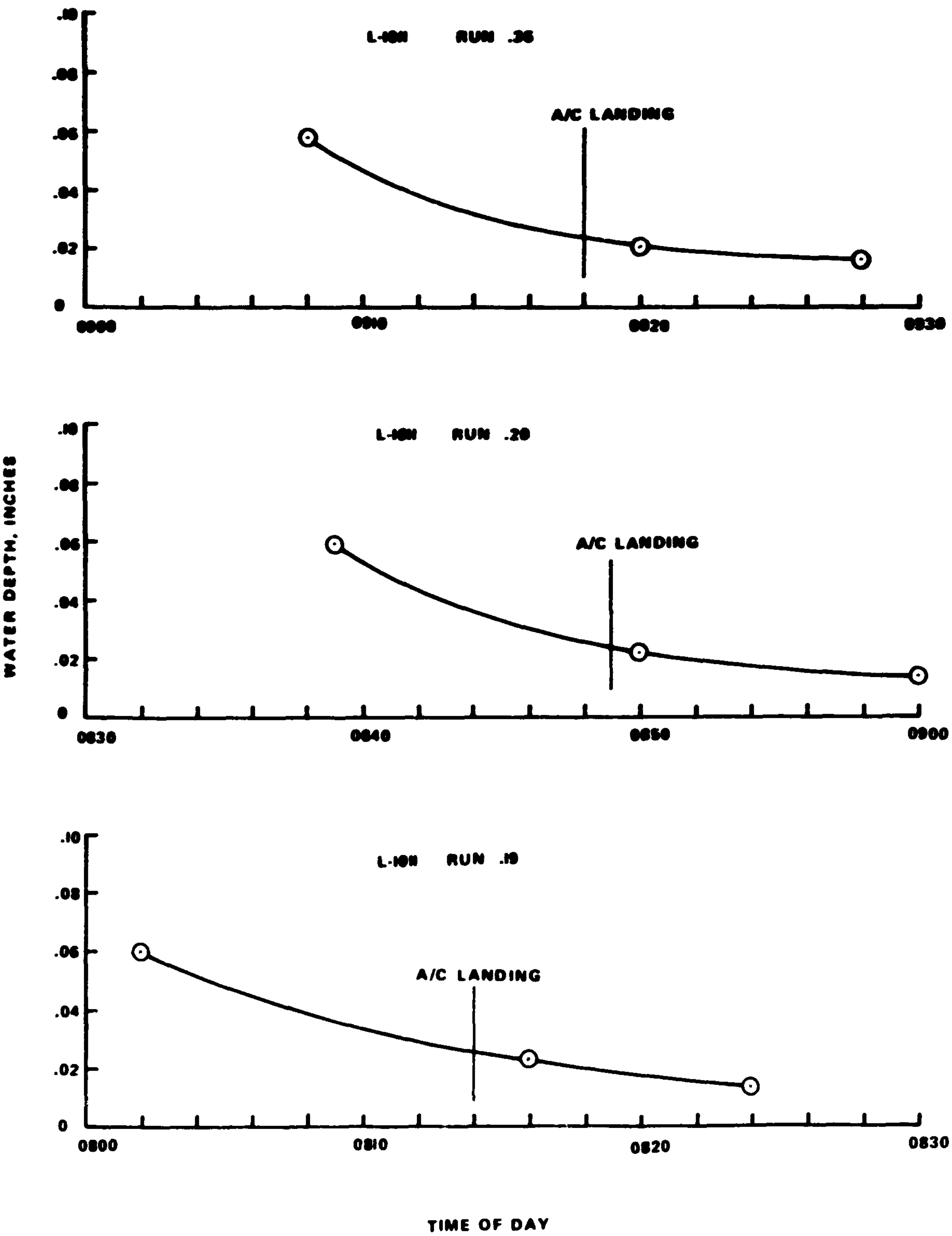


FIGURE 27 (B)

WATER DEPTH AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 24, 1973

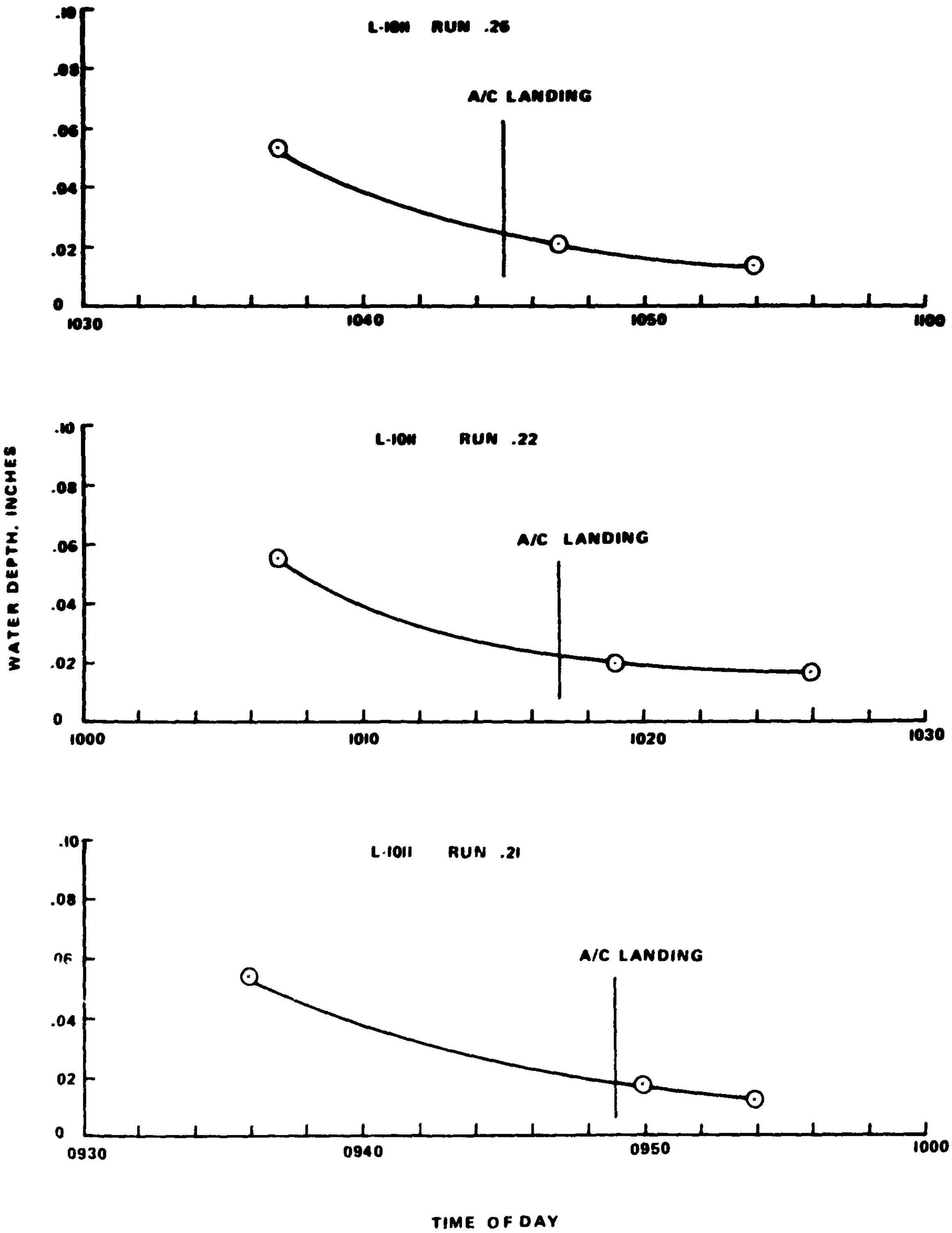


FIGURE 27 (C)

WATER DEPTH AS A FUNCTION OF TIME

RUNWAY 03 ROSWELL, N. M.

OCTOBER 24, 1973

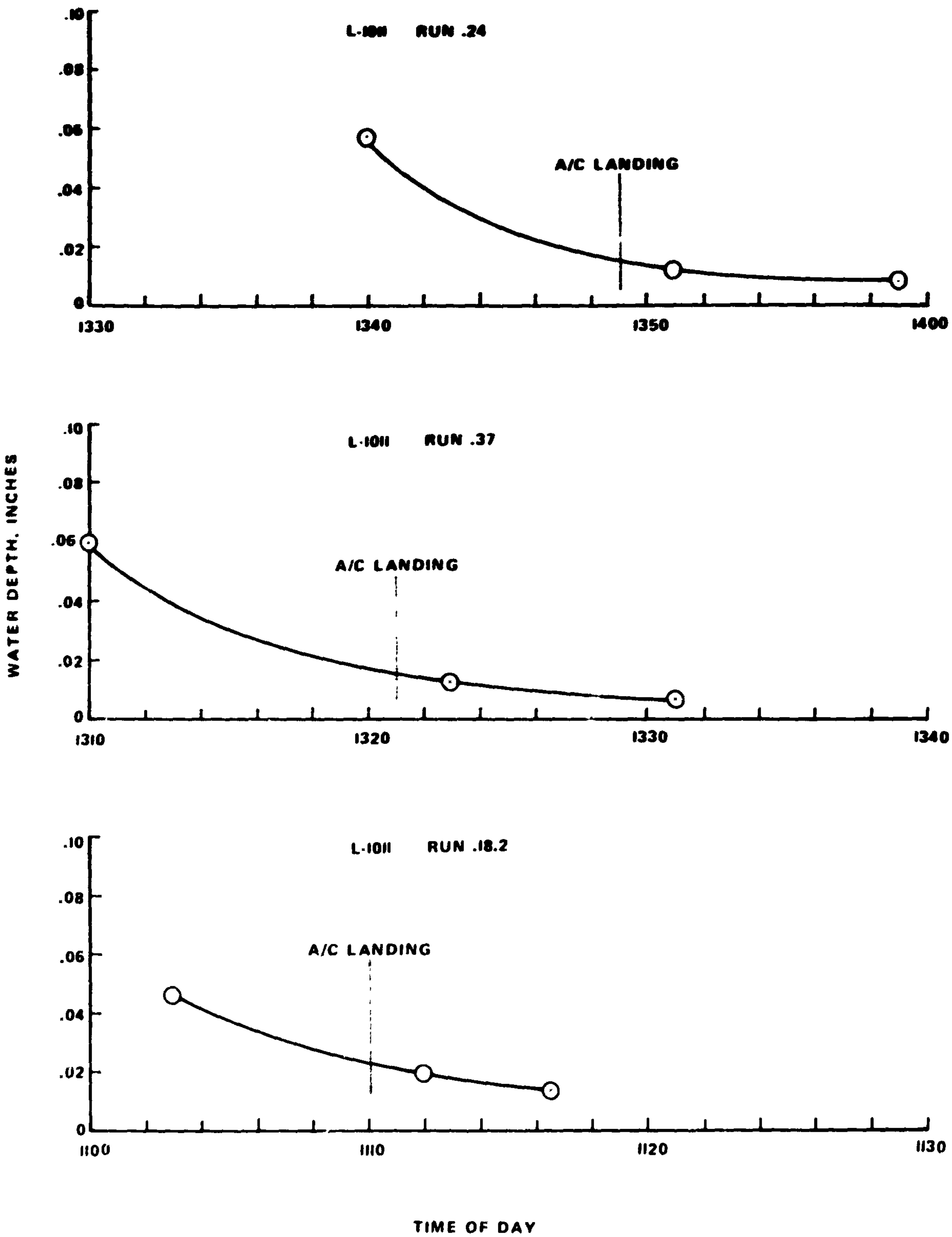


FIGURE 27(D)
WATER DEPTH AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 25, 1973

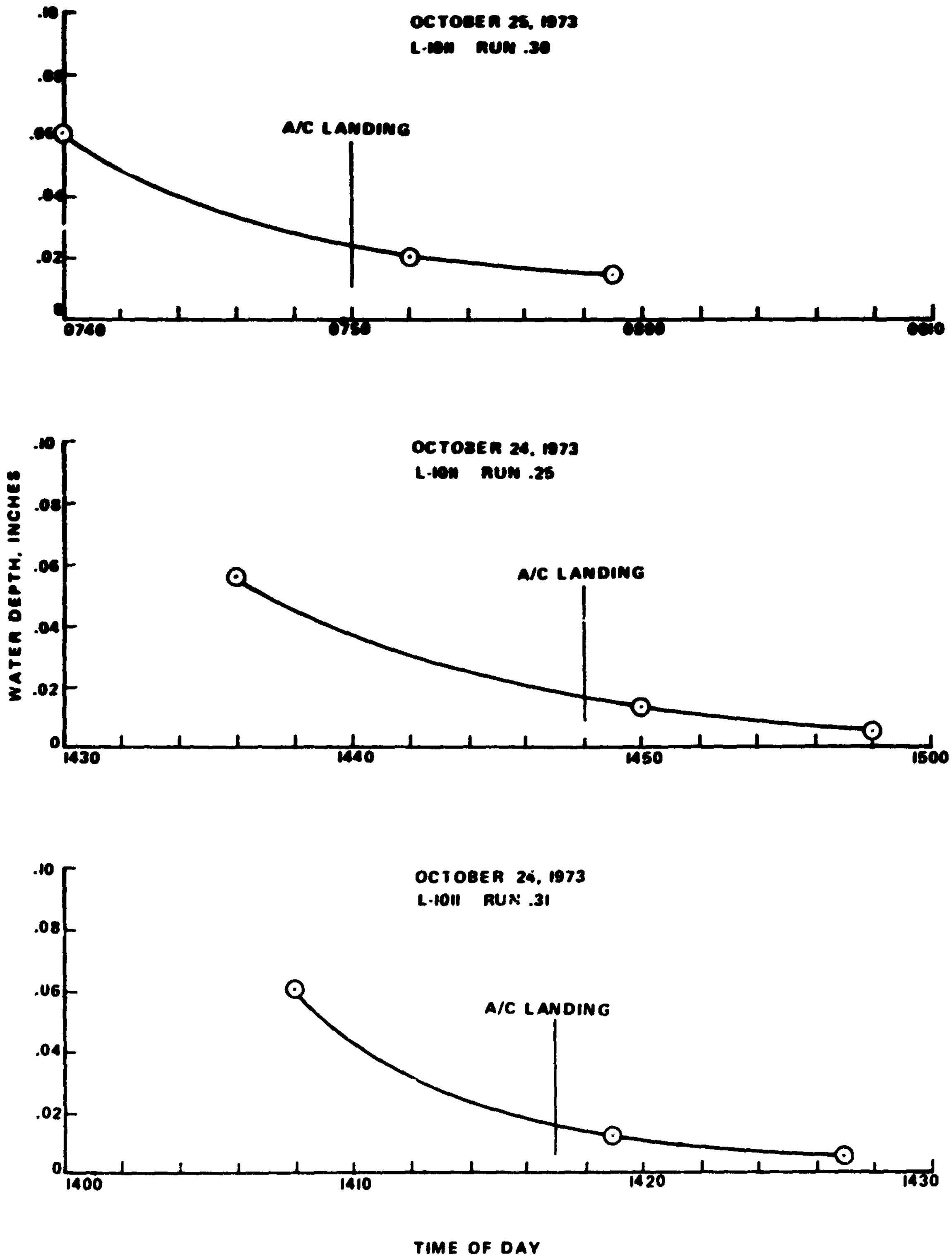


FIGURE [illegible] (E)

WATER DEPTH AS A FUNCTION OF TIME
RUNWAY [illegible] ROSWELL, N. M.
OCTOBER 25, [illegible]

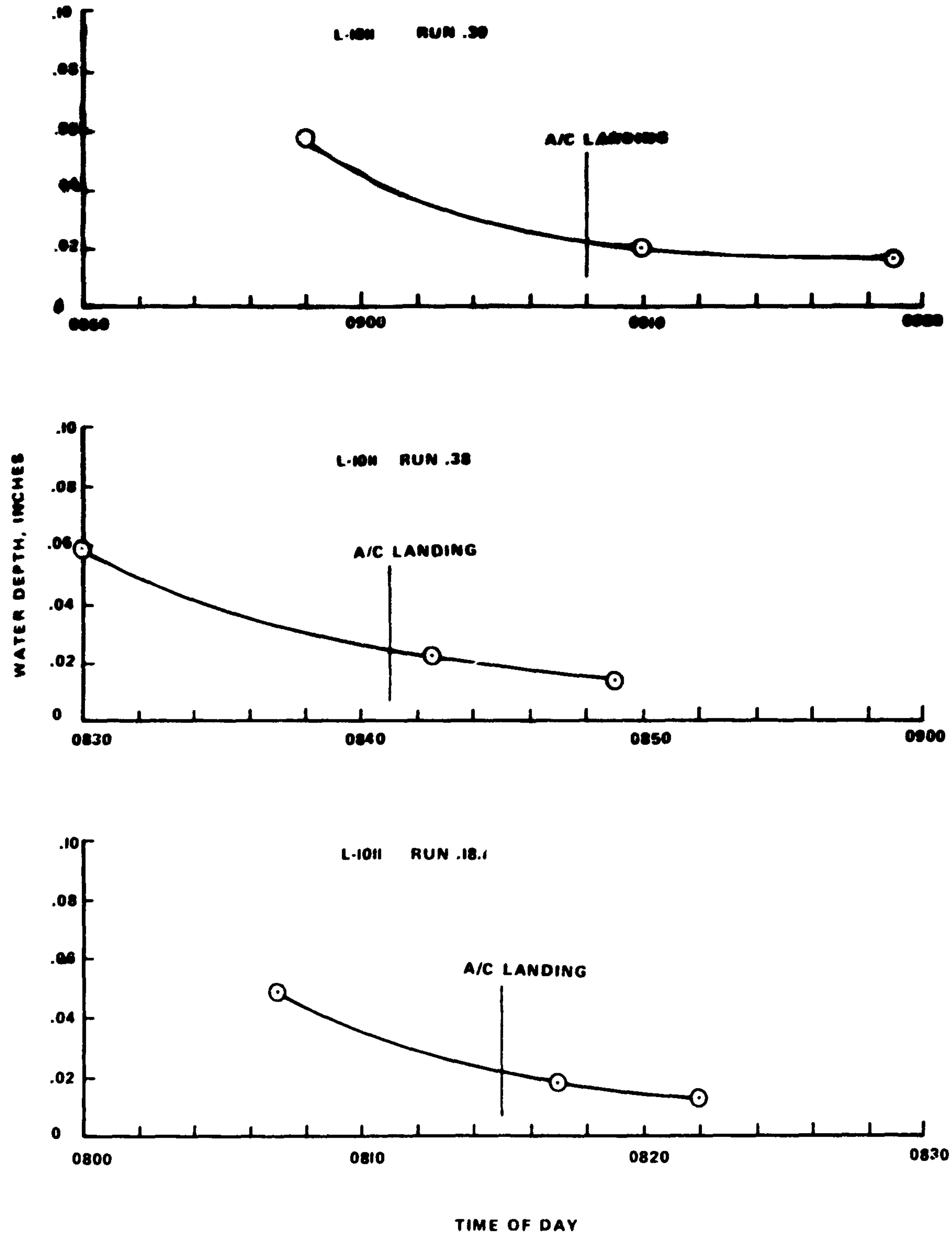


FIGURE 27 (F)
WATER DEPTH AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 25, 1973

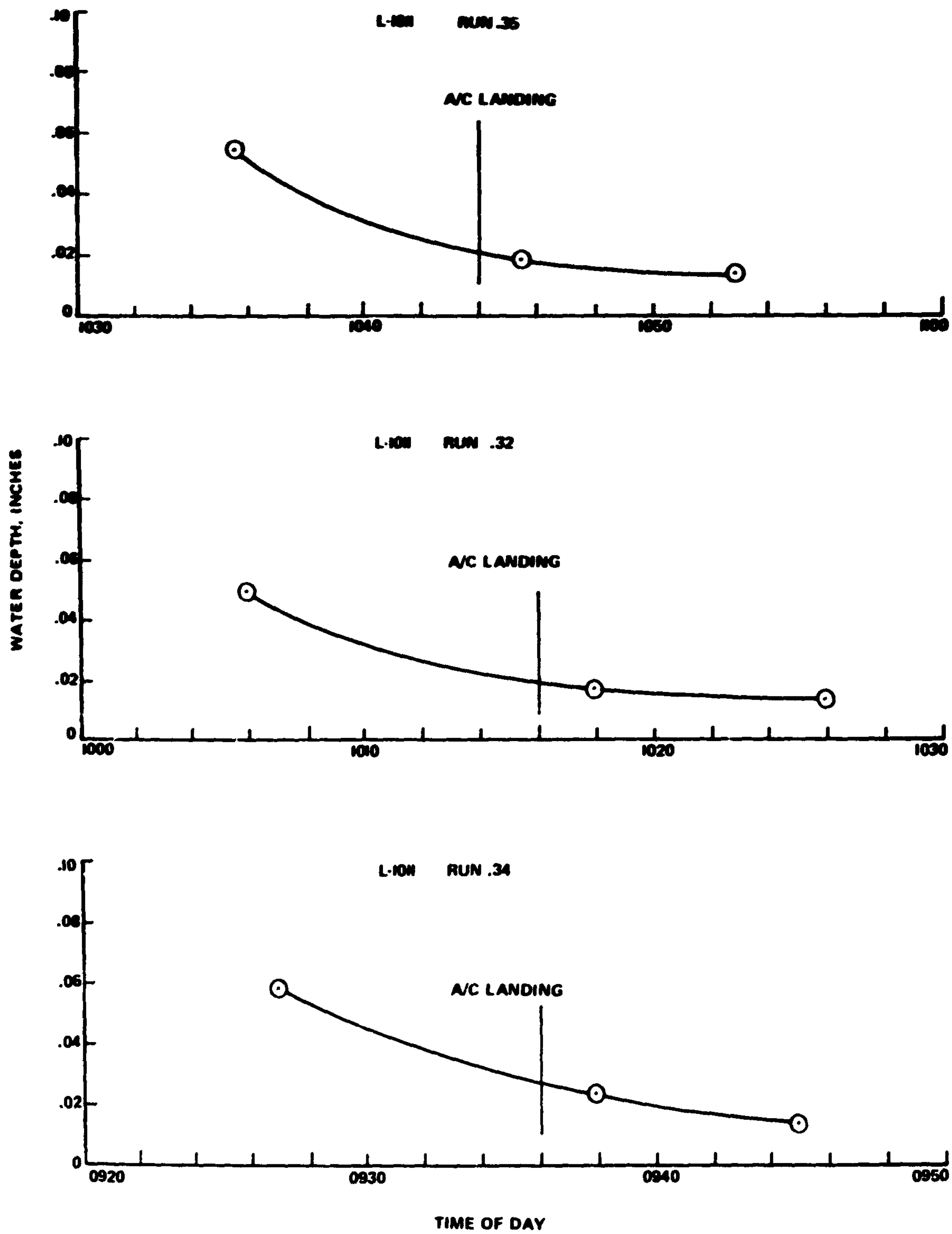


FIGURE 27 (G)

WATER DEPTH AS A FUNCTION OF TIME

RUNWAY 03 ROSWELL, N. M.

OCTOBER 25, 1973

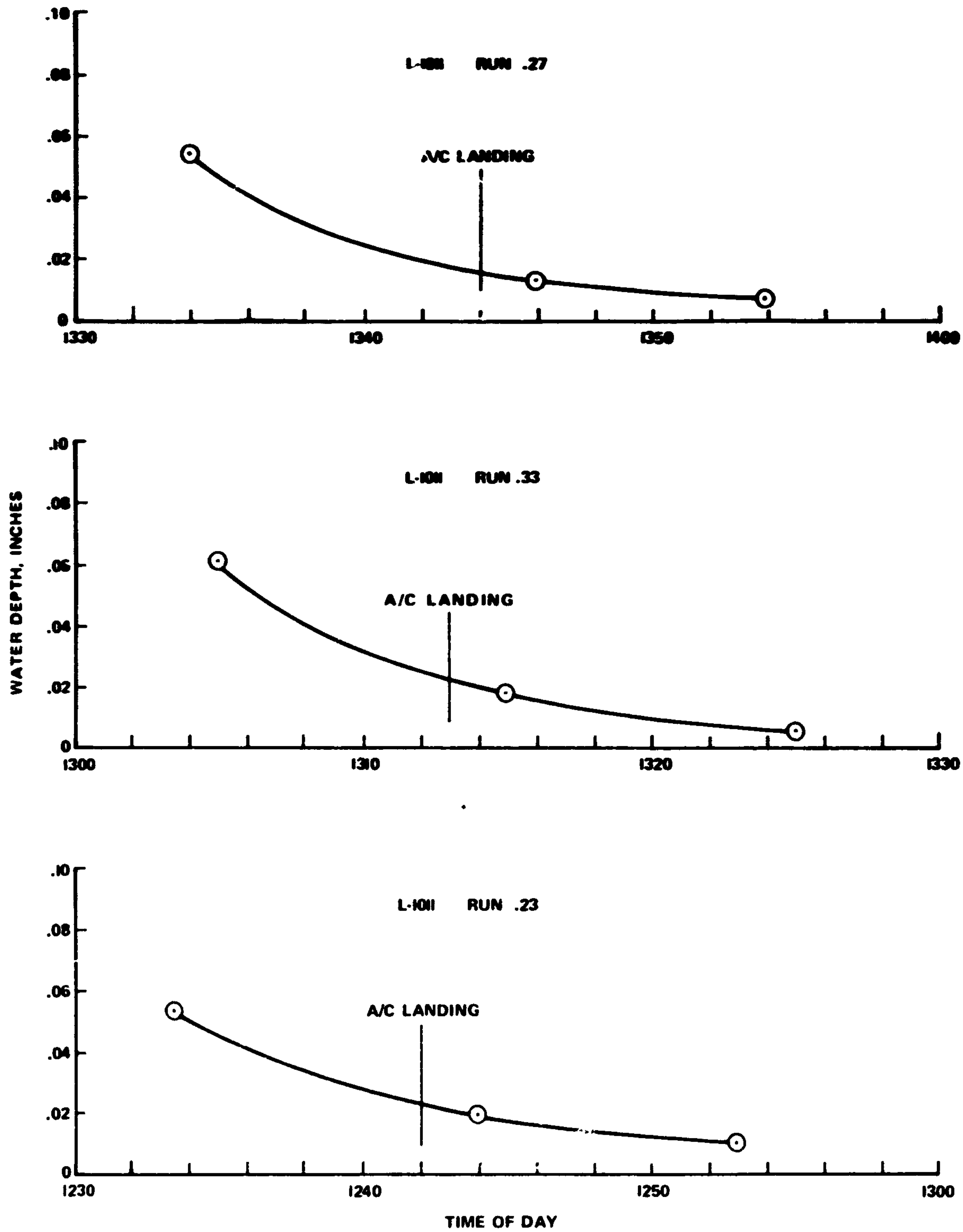


FIGURE 27 (U)

WATER DEPTH AS A FUNCTION OF TIME

RUNWAY 03 ROSWELL, N. M.

OCTOBER 25, 1973

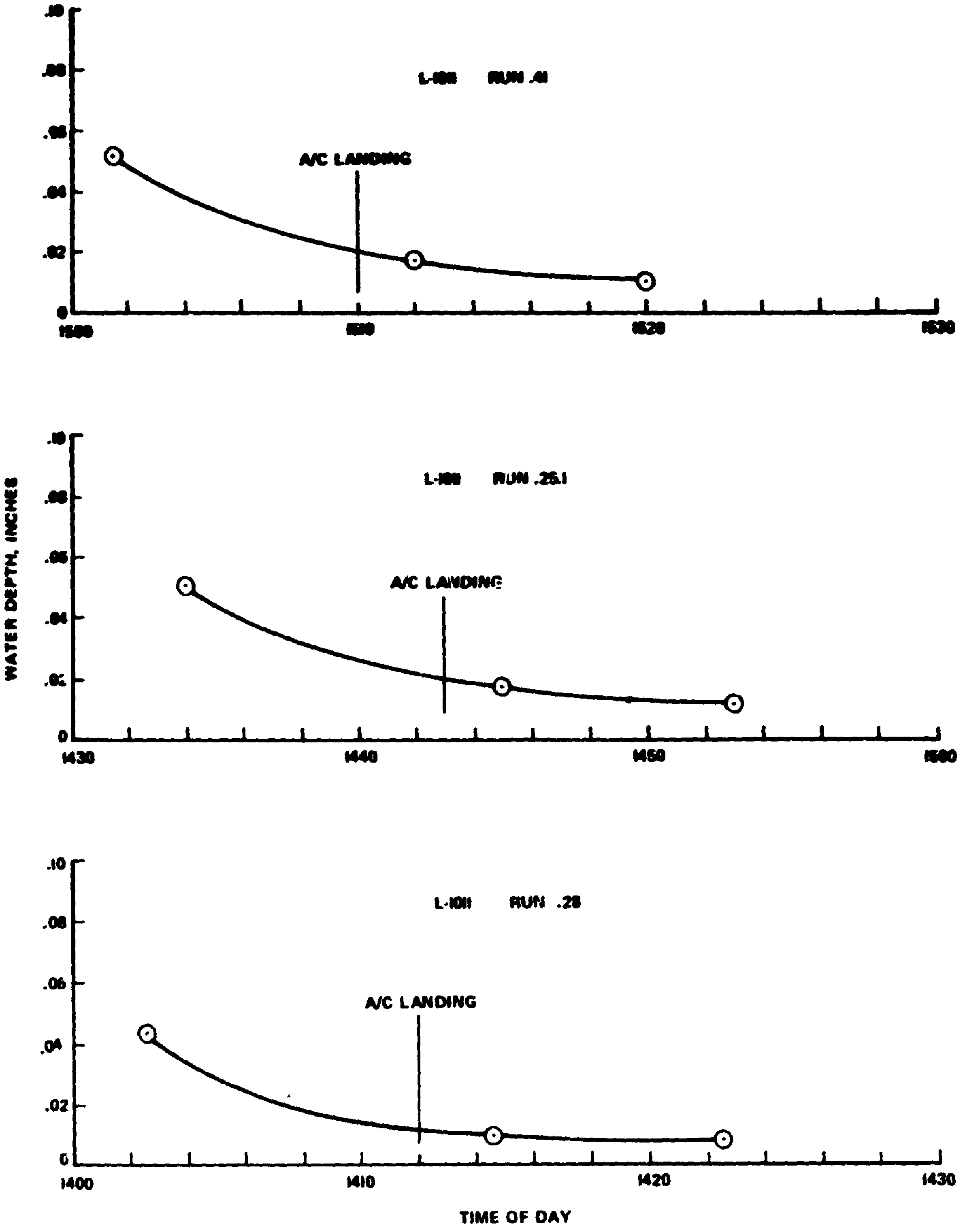


FIGURE 28 (A)

WATER DEPTH AND GROUND VEHICLE

RUNS AS A FUNCTION OF TIME

RUNWAY 03 ROSWELL, N. M.

OCTOBER 24, 1973

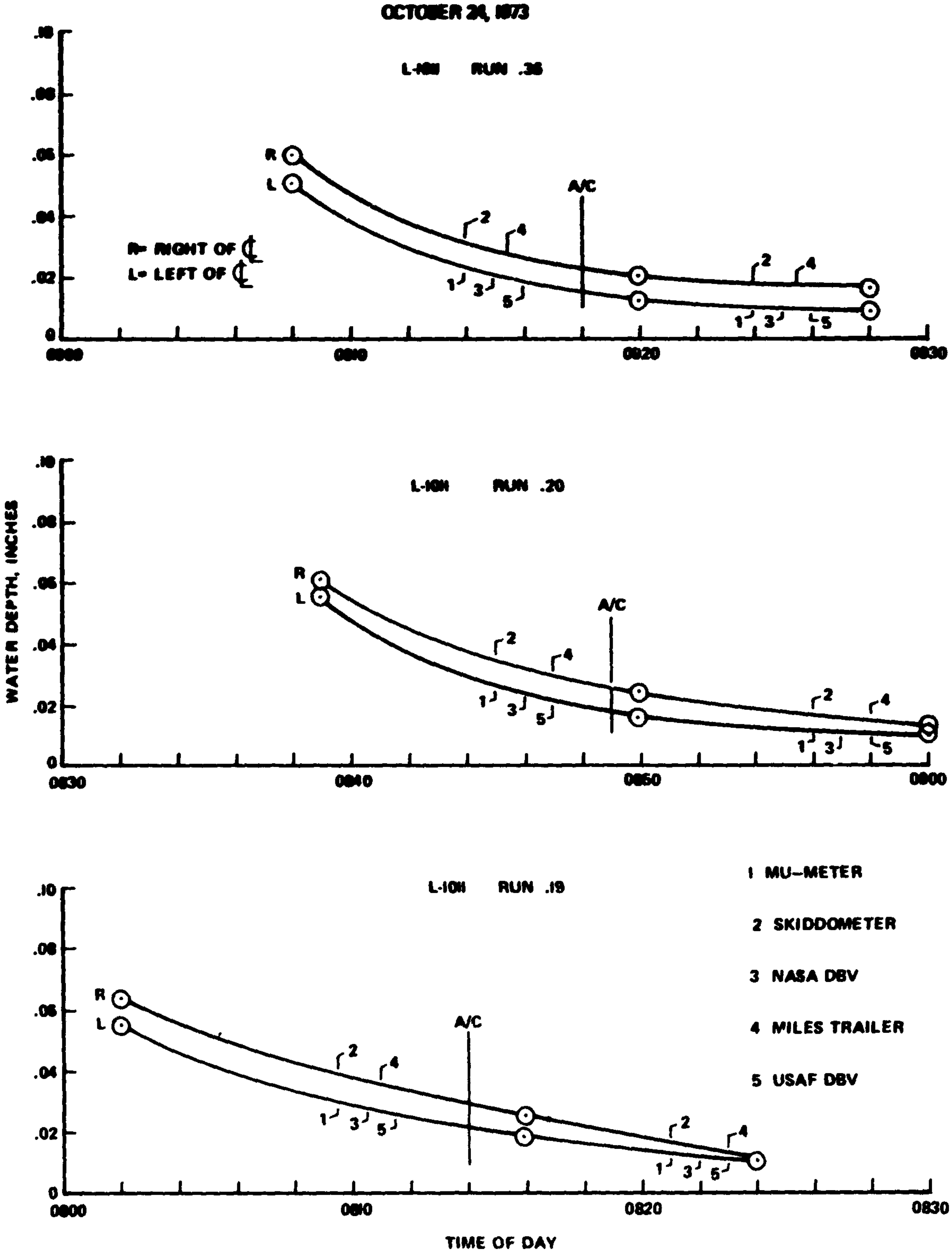


FIGURE 28 (B)

WATER DEPTH AND GROUND VEHICLE
RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 24, 1973

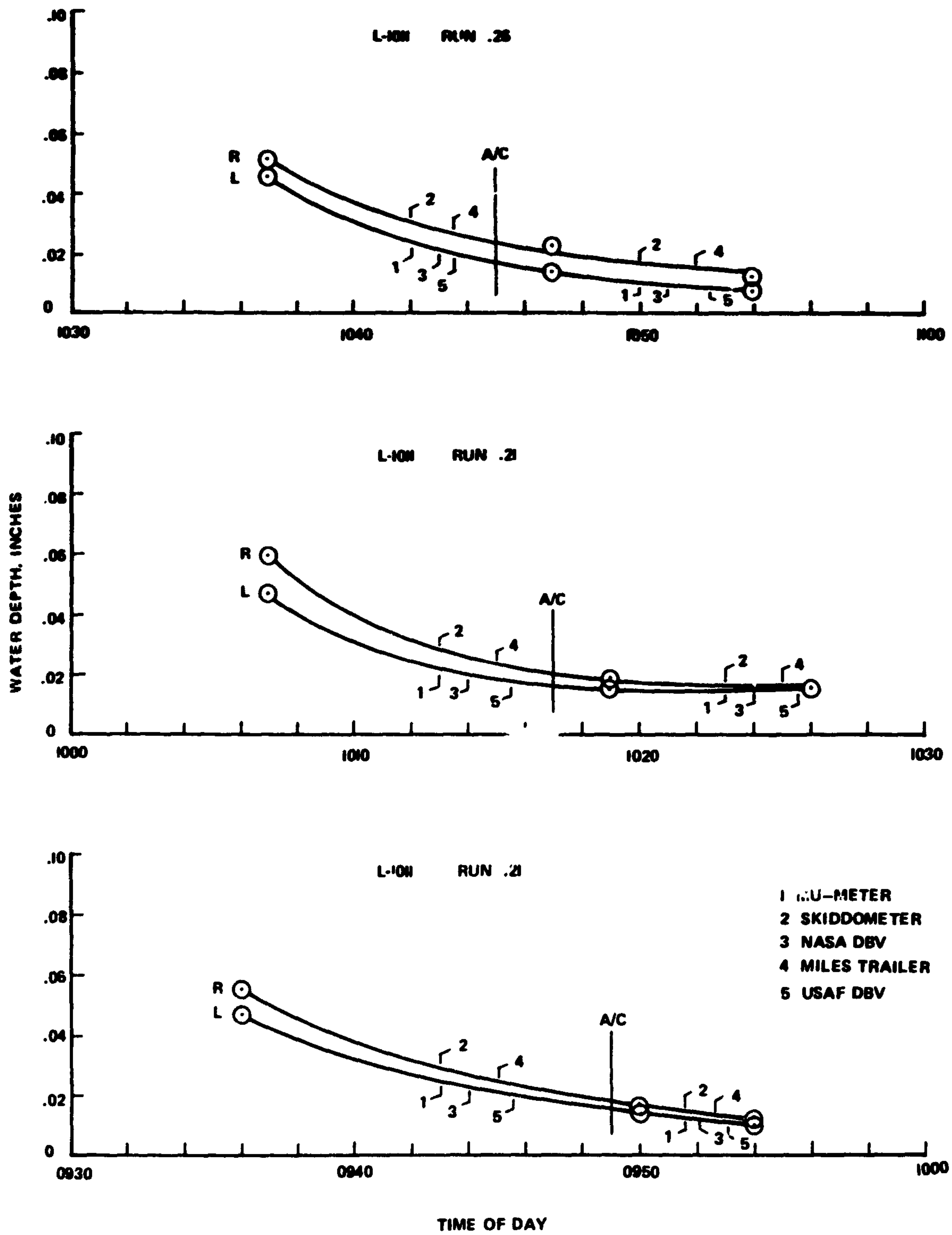


FIGURE 28 (C)
WATER DEPTH AND GROUND VEHICLE
RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 24, 1973

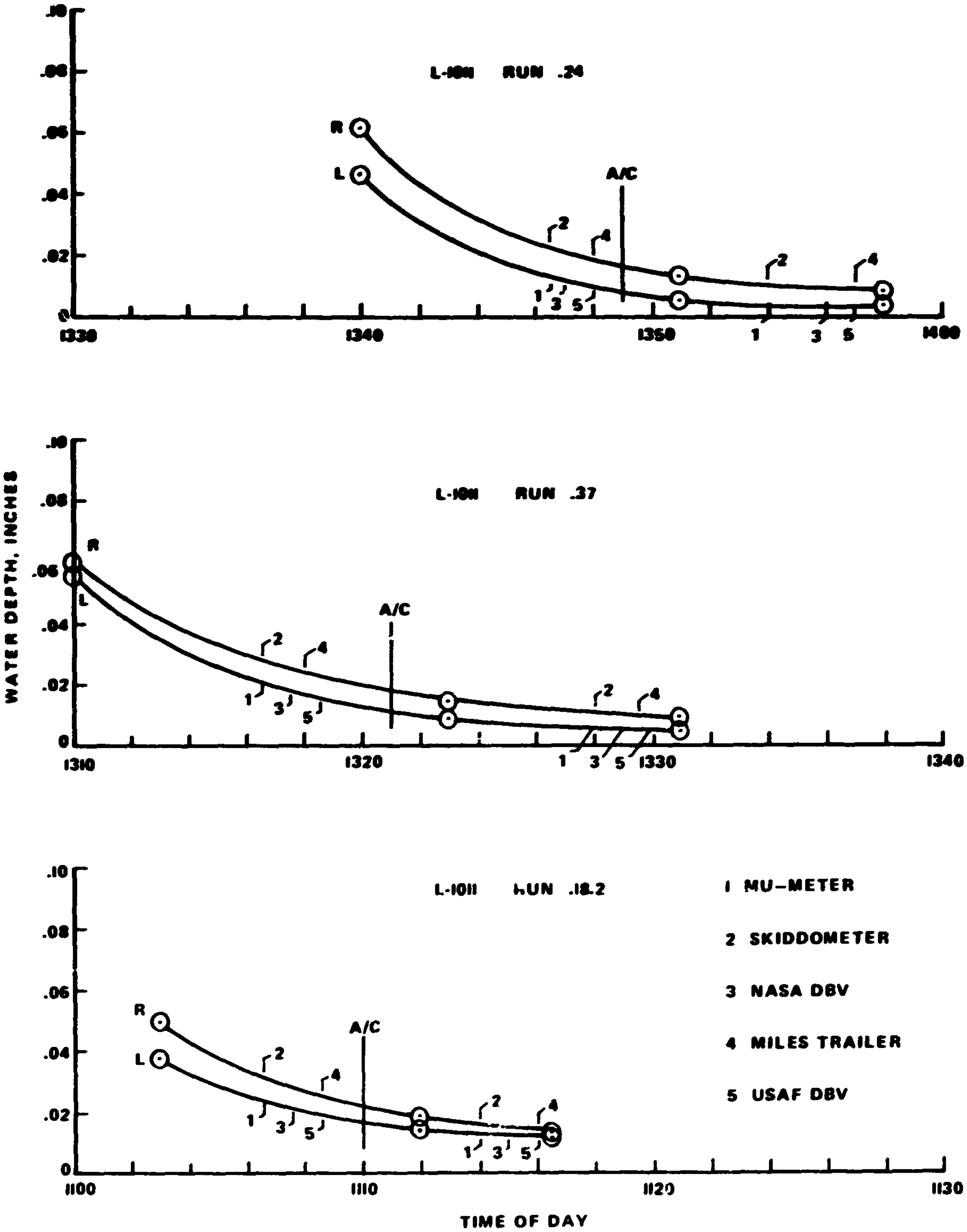


FIGURE 28 (D)
WATER DEPTH AND GROUND VEHICLE
RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.

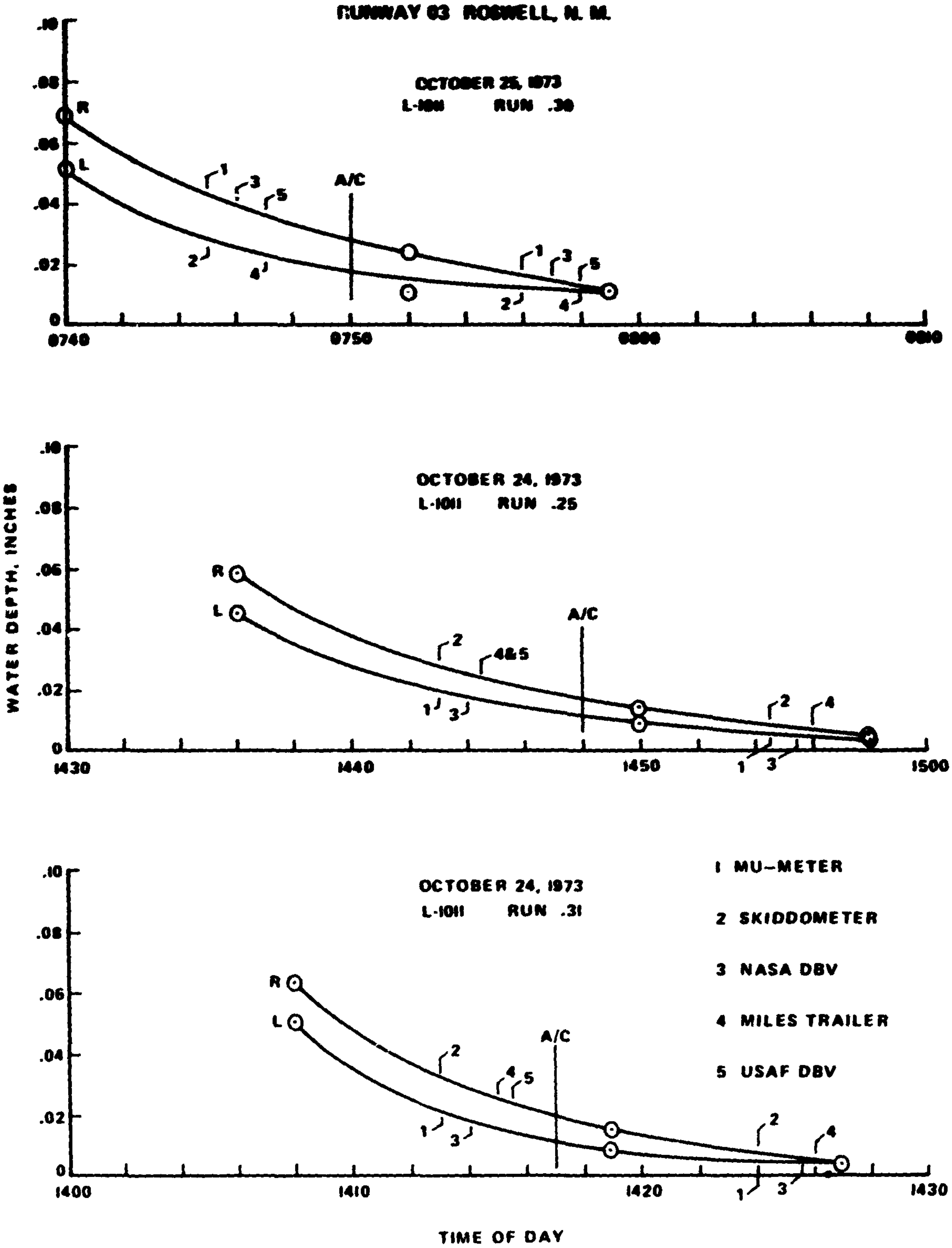


FIGURE 28 (E)
WATER DEPTH AND GROUND VEHICLE
RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 25, 1973

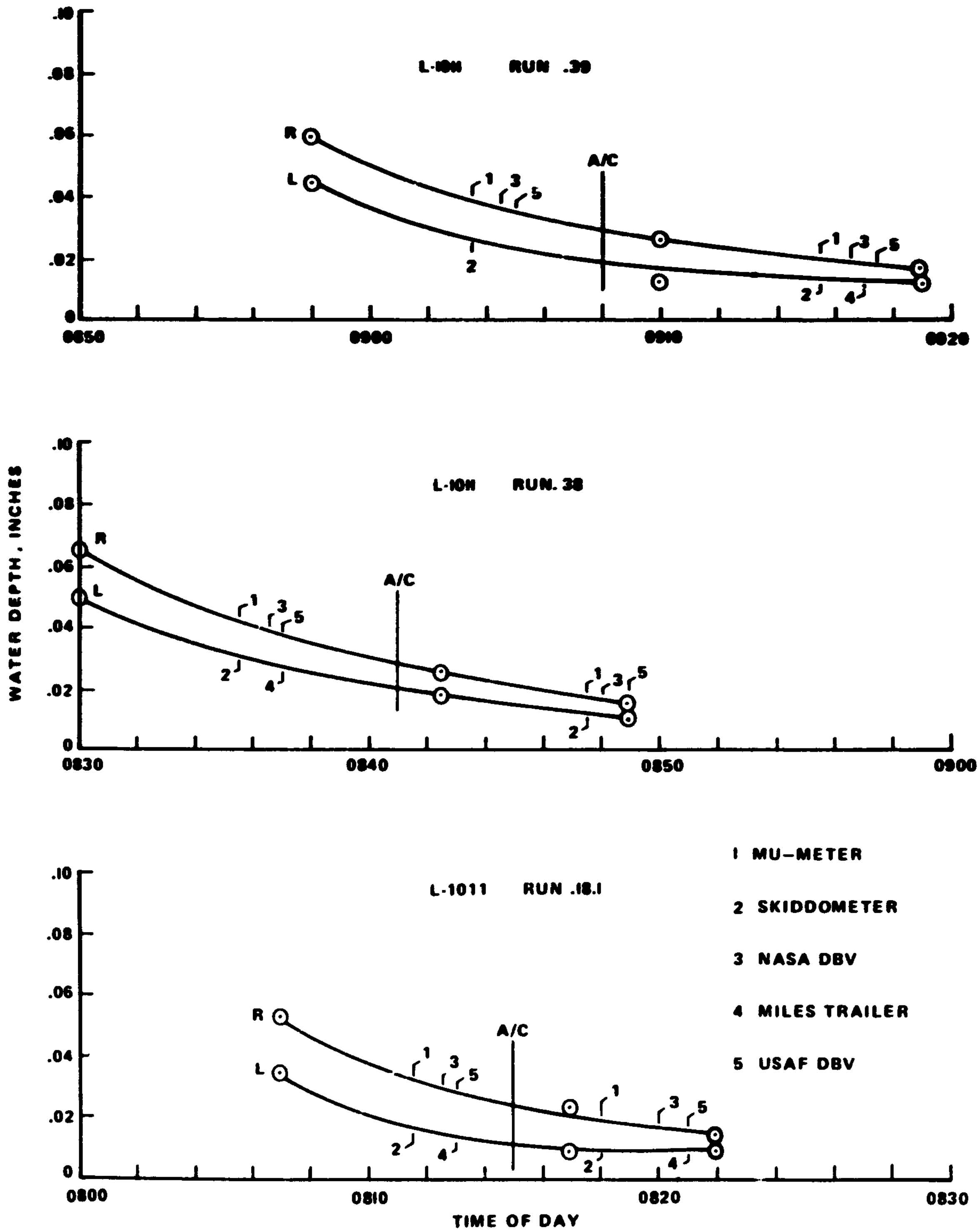


FIGURE 28 (F)
WATER DEPTH AND GROUND VEHICLE
RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 25, 1973

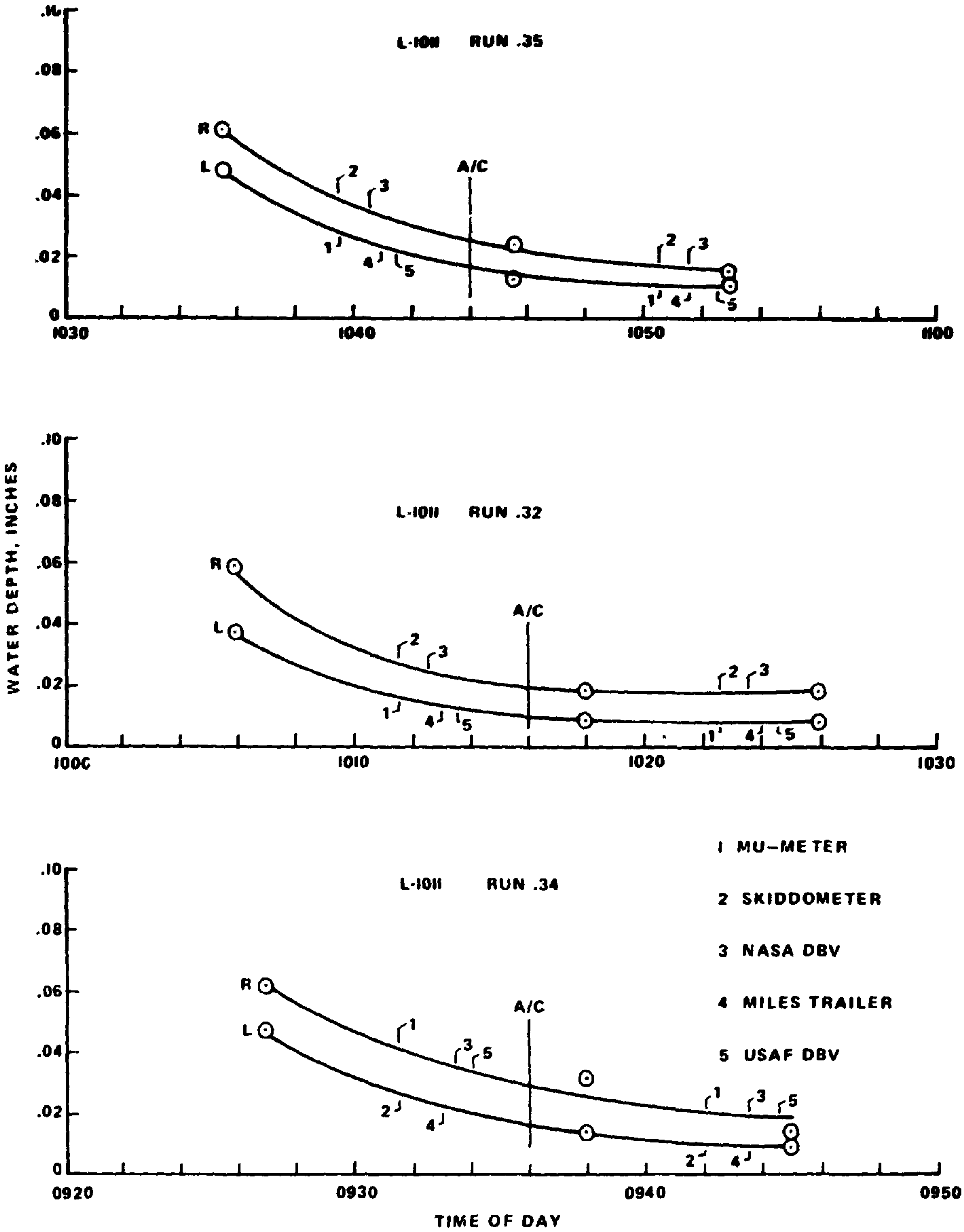


FIGURE 28(G)
WATER DEPTH AND GROUND VEHICLE
RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 25, 1973

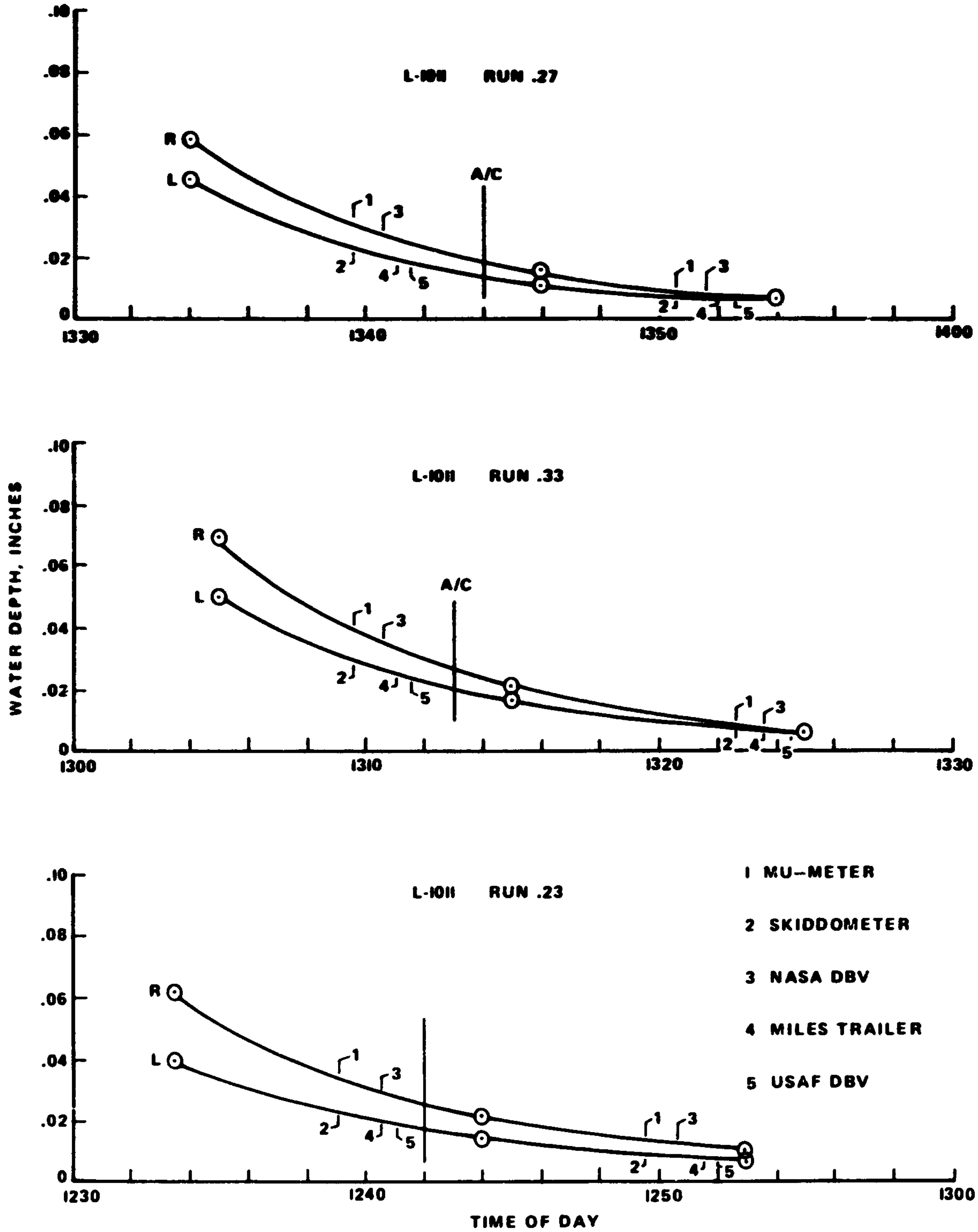


FIGURE 28 (H)
WATER DEPTH AND GROUND VEHICLE
RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 24, 1973

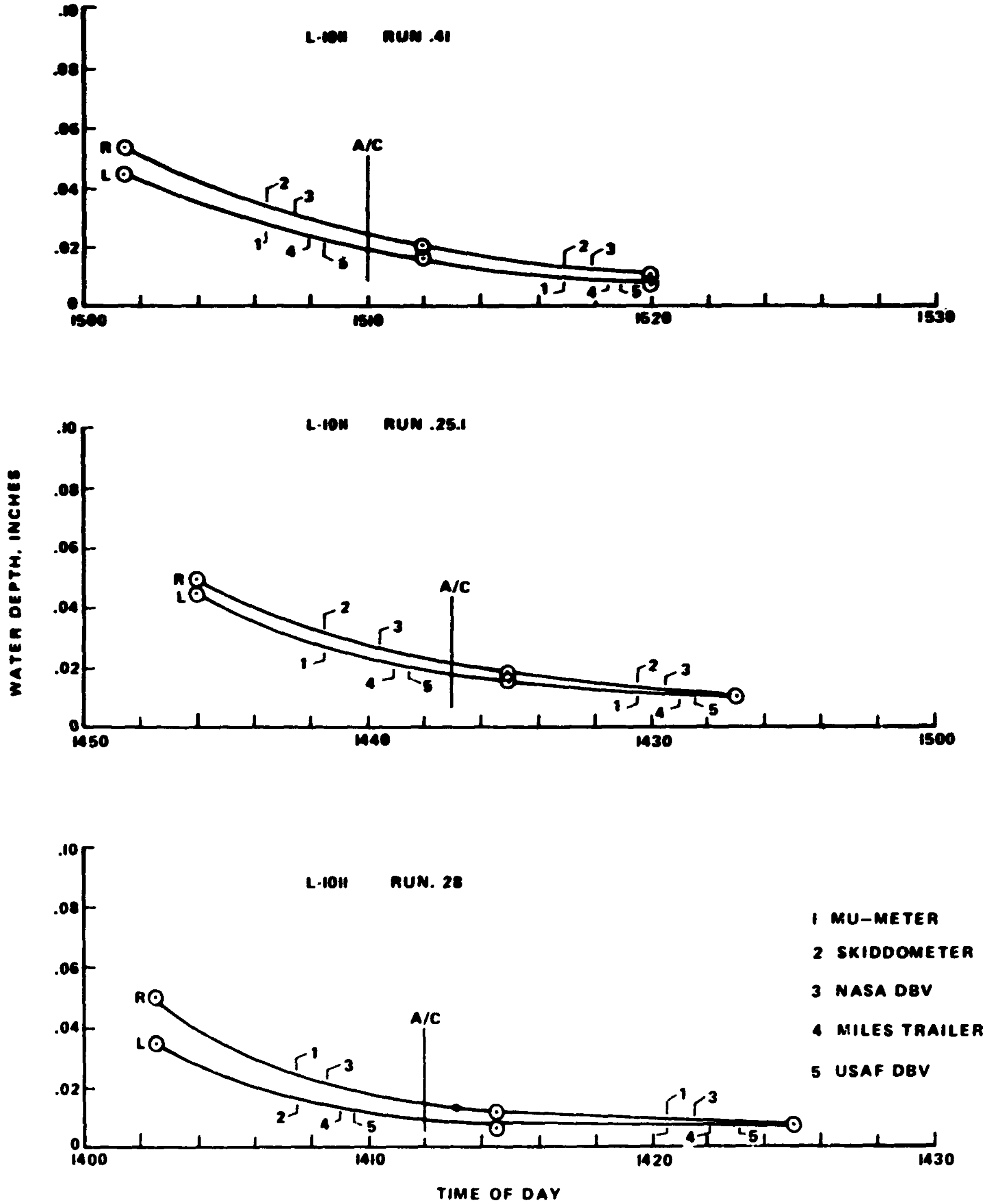


FIGURE 29 (A)
WATER DEPTH AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 17, 1973

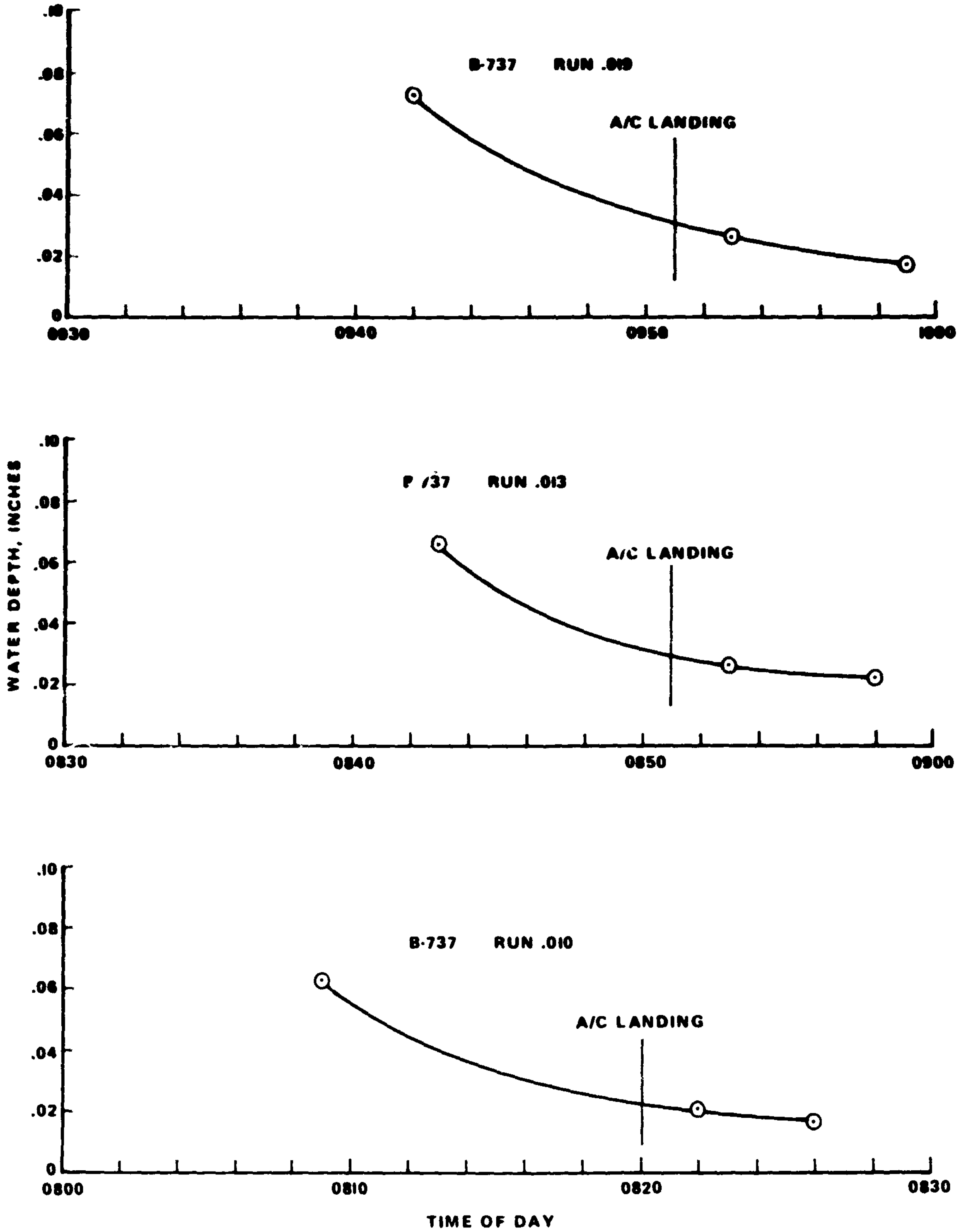


FIGURE 29 (B)

WATER DEPTH AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 17, 1973

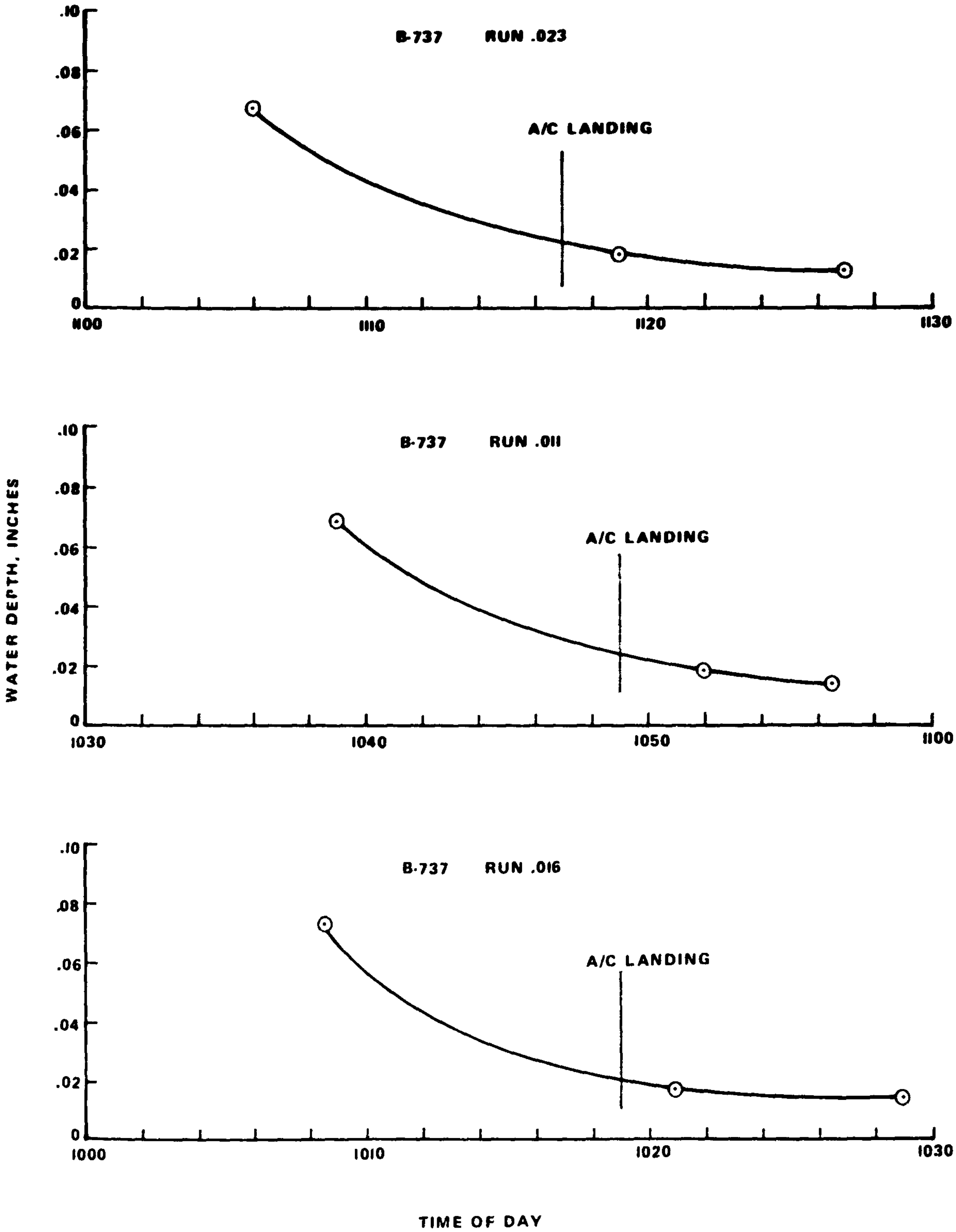


FIGURE 29 (D)

WATER DEPTH AS A FUNCTION OF TIME

RUNWAY 03 ROSWELL, N. M.

OCTOBER 17, 1973

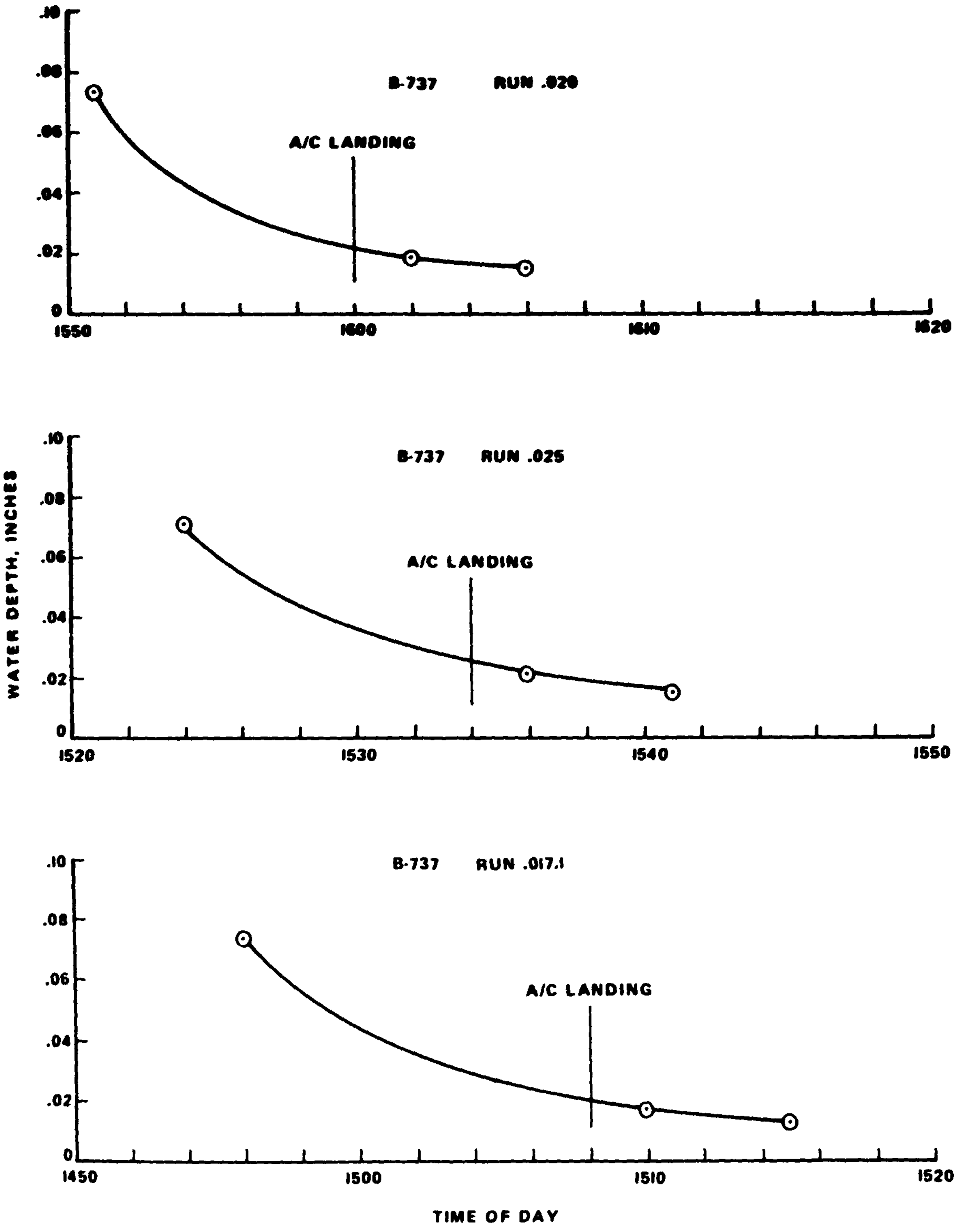


FIGURE 29 (E)
WATER DEPTH AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.

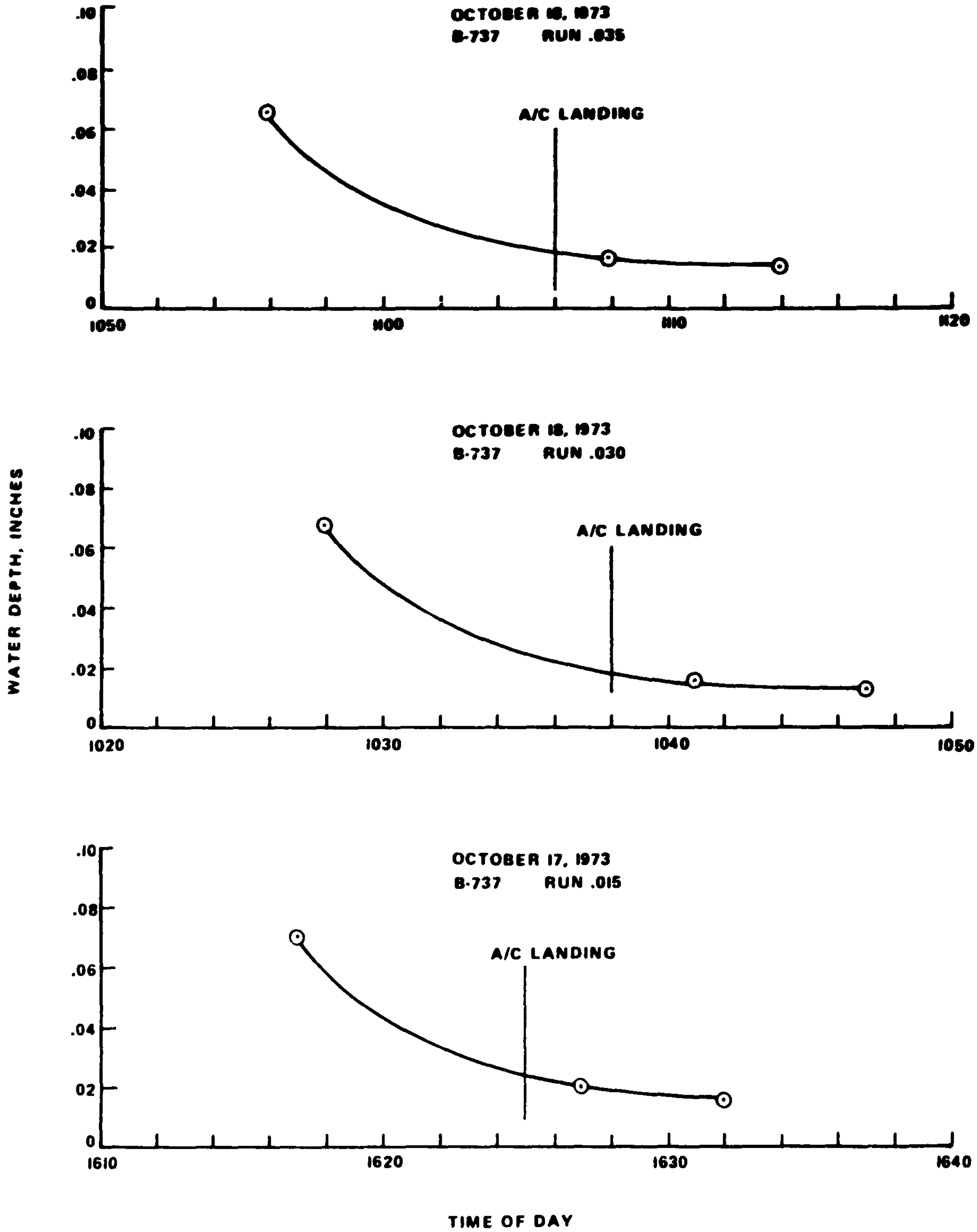


FIGURE 29 (F)
WATER DEPTH AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 18, 1973

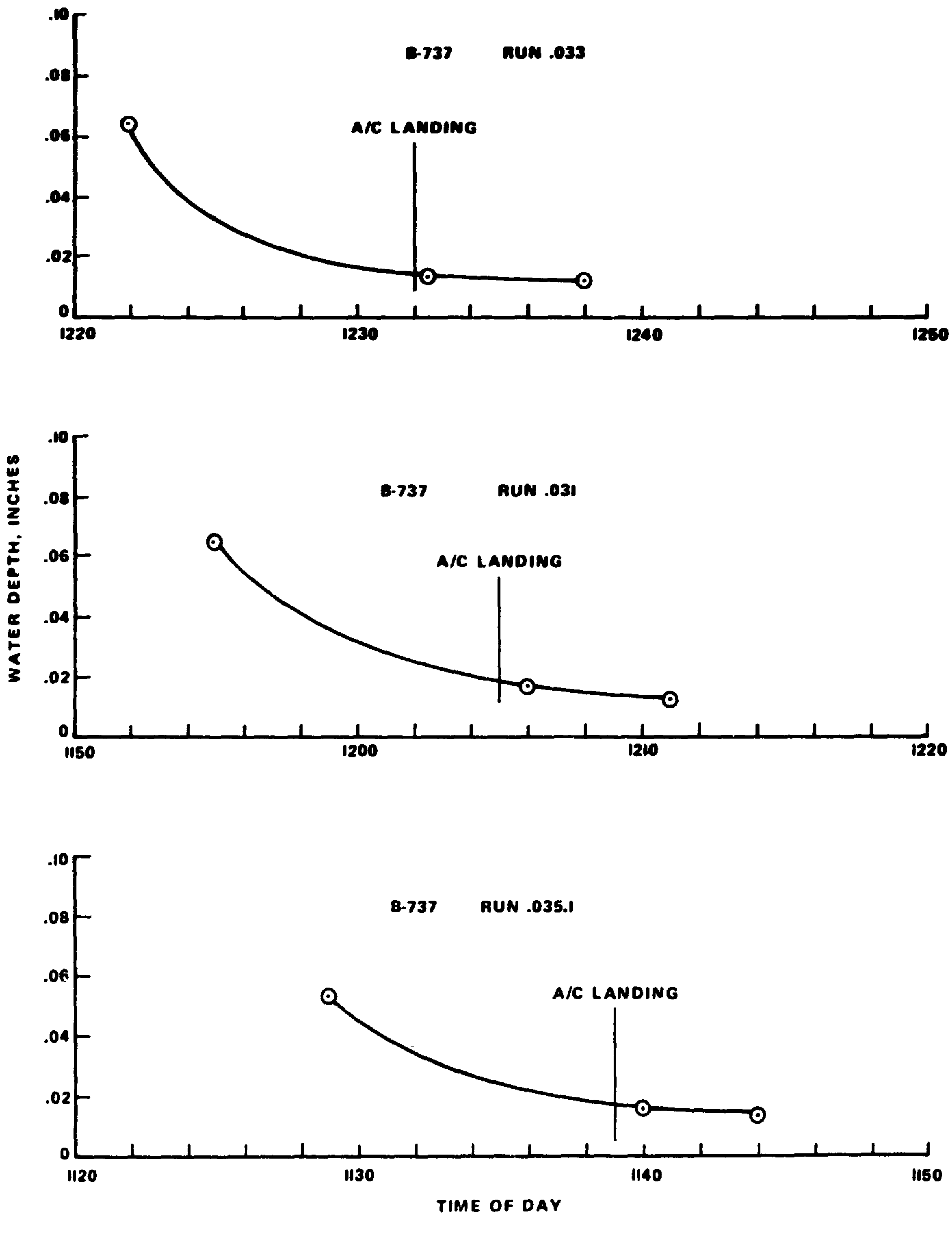


FIGURE 29 (G)
WATER DEPTH AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 18, 1973

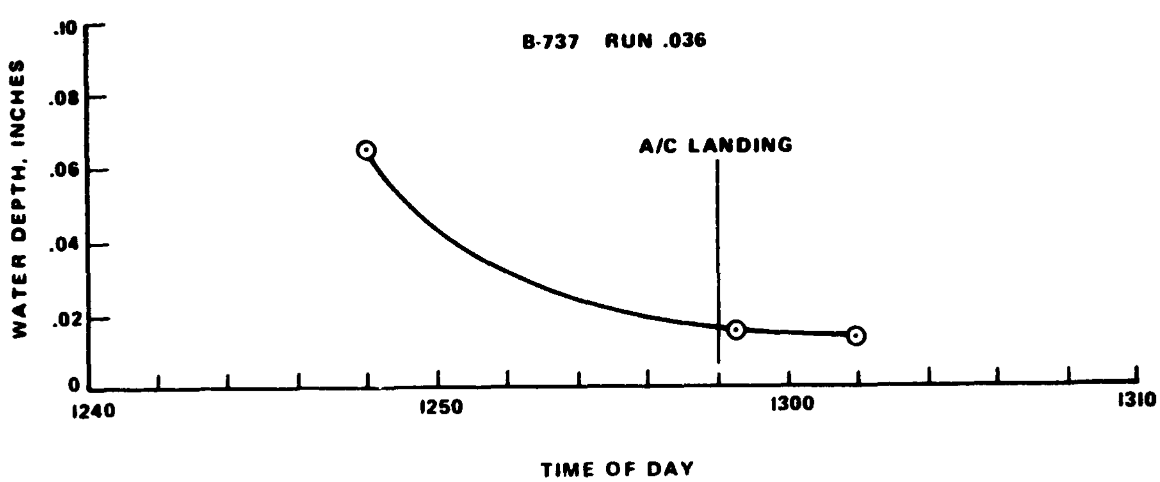


FIGURE 30 (A)
WATER DEPTH AND GROUND VEHICLE
RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 17, 1973

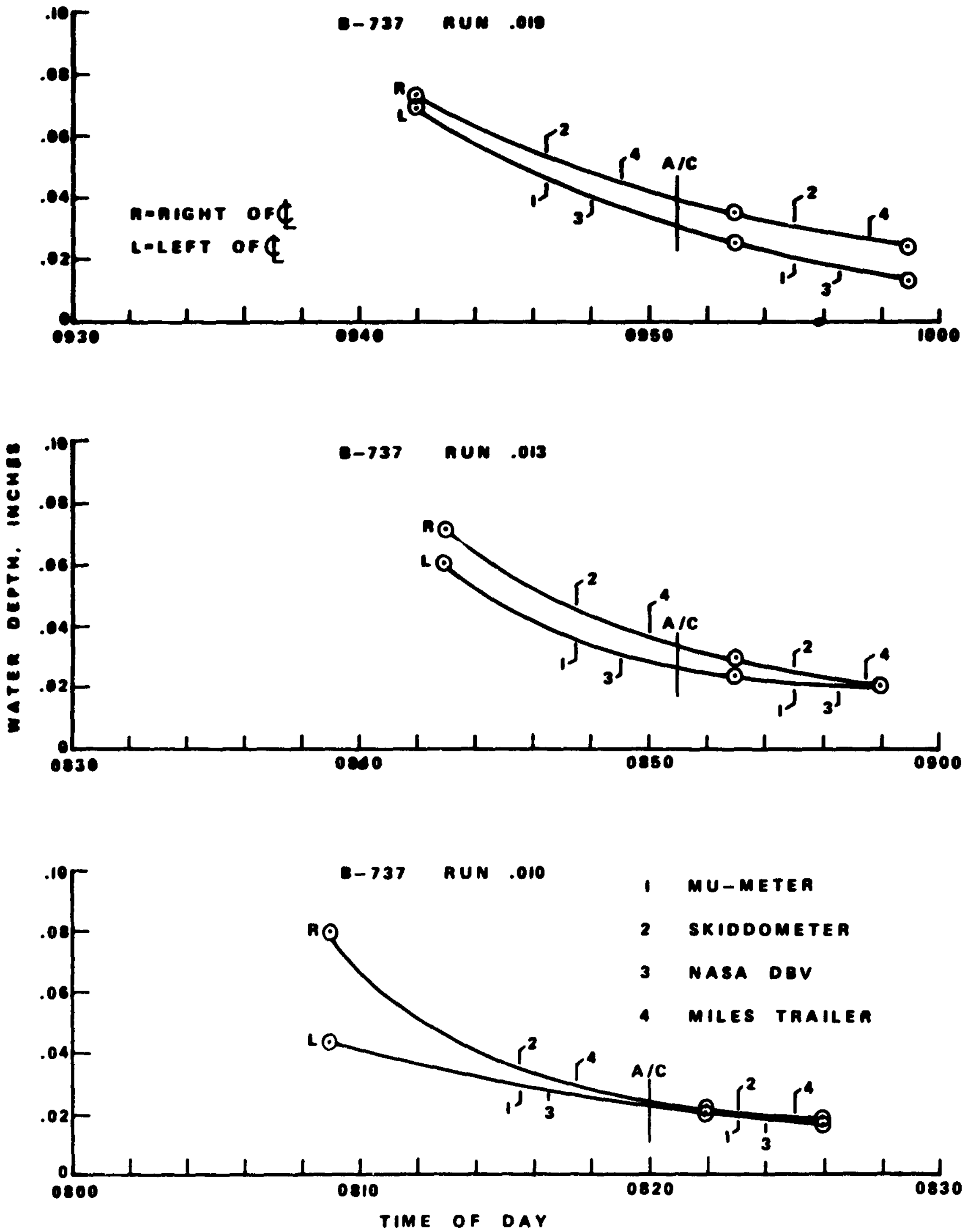


FIGURE 30(B)
WATER DEPTH AND GROUND VEHICLE
RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N.M.
OCTOBER 17, 1973

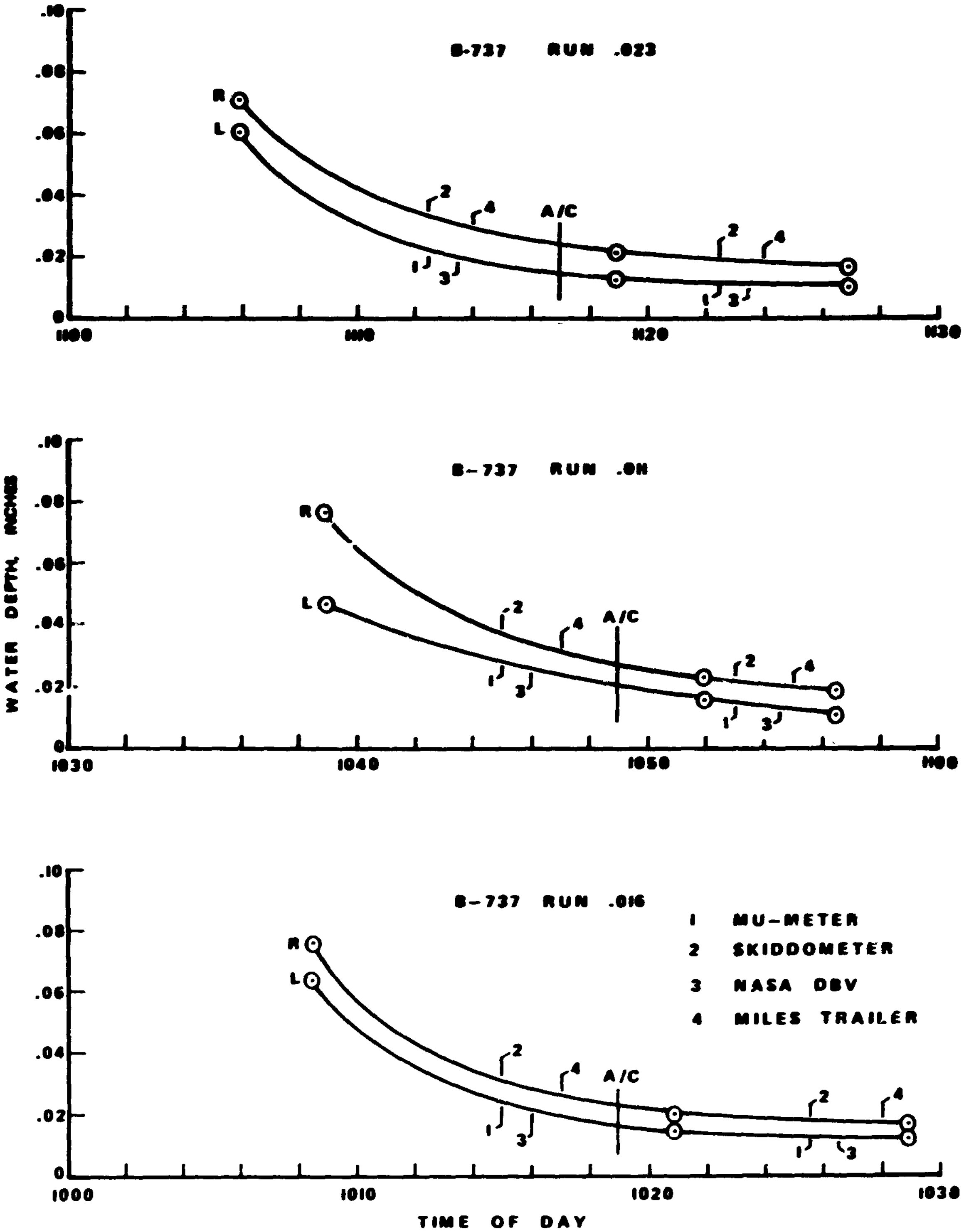


FIGURE 30 (C)
WATER DEPTH AND GROUND VEHICLE
RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.

OCTOBER 17, 1973

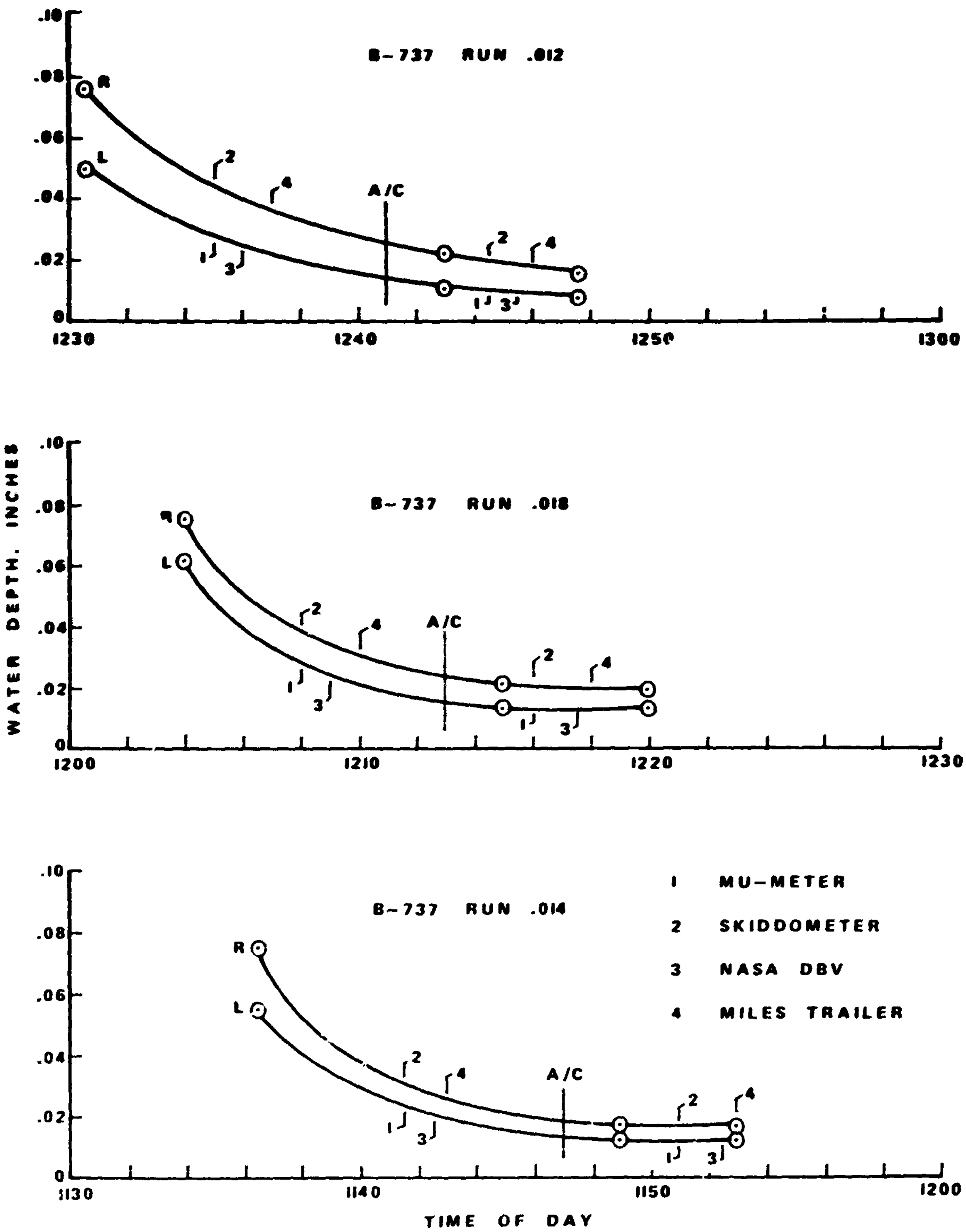


FIGURE 30 (D)
WATER DEPTH AND GROUND VEHICLE
RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 17, 1973

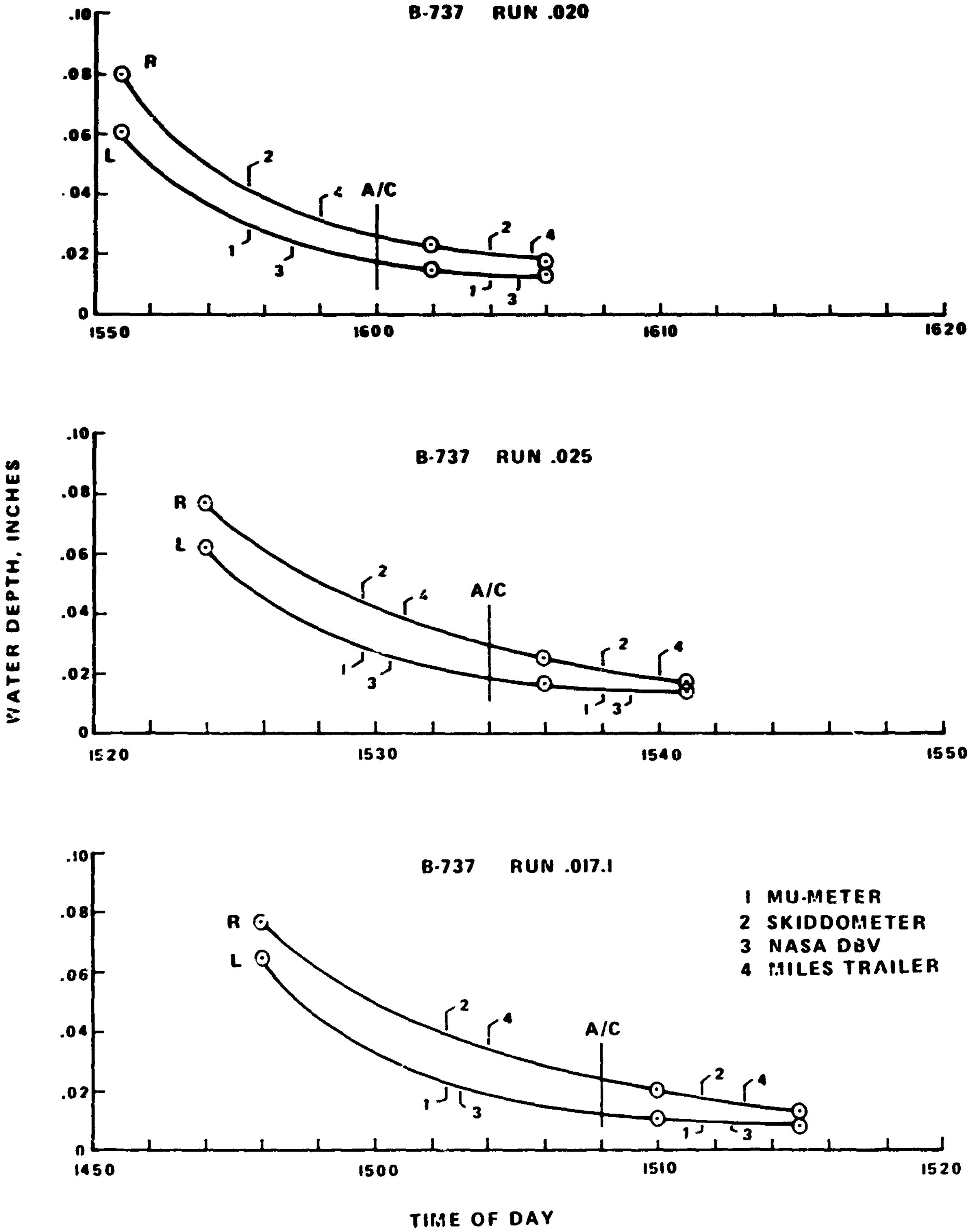


FIGURE 30(E)
WATER DEPTH AND GROUND VEHICLE RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.

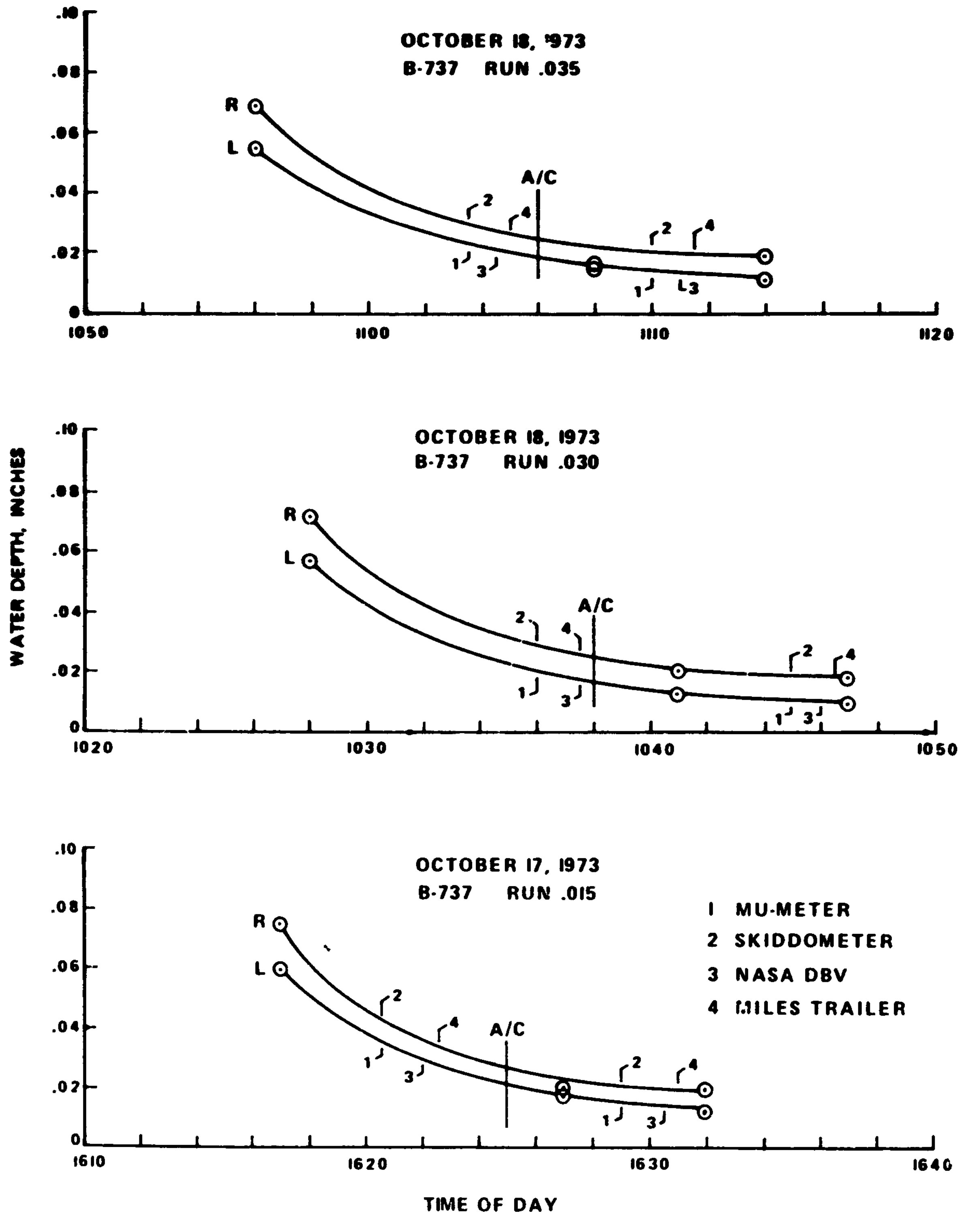


FIGURE 30(F)
WATER DEPTH AND GROUND VEHICLE RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.

OCTOBER 18, 1973

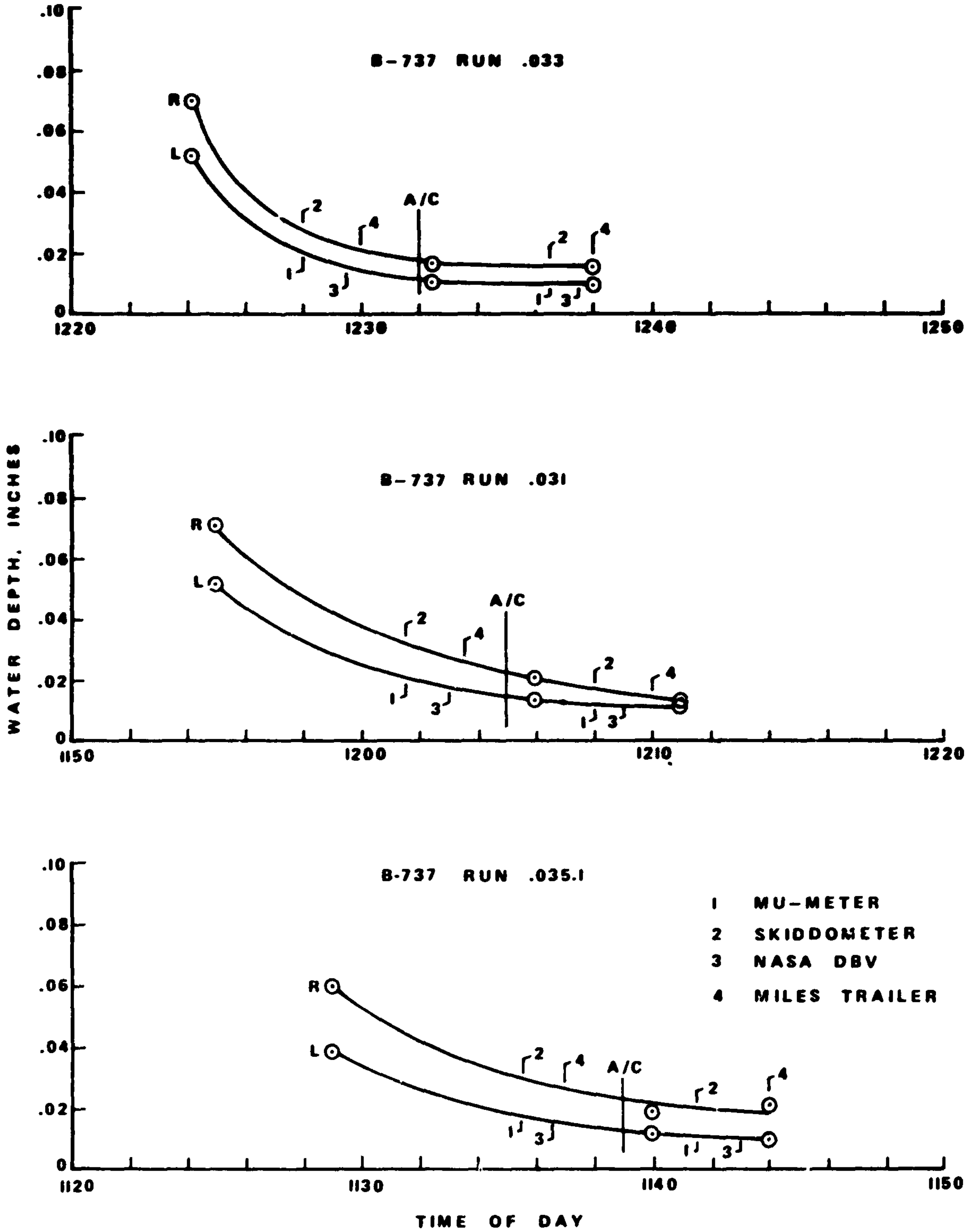


FIGURE 30 (G)

WATER DEPTH AND GROUND VEHICLE
RUNS AS A FUNCTION OF TIME
RUNWAY 03 ROSWELL, N. M.
OCTOBER 18, 1973

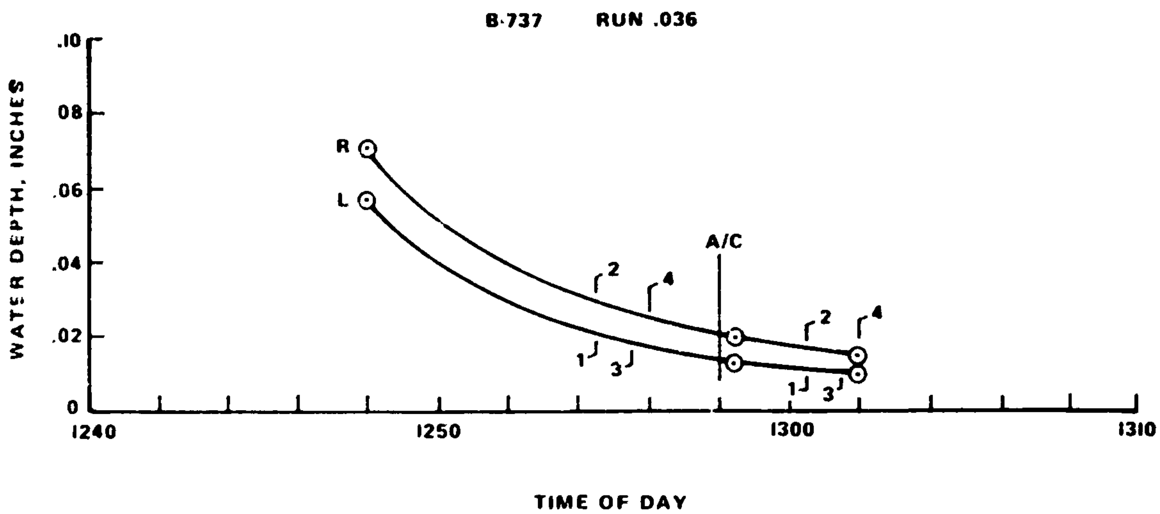


FIGURE 31
EFFECT OF WATER DEPTH
ON AIRCRAFT STOPPING DISTANCE
NO REVERSE THRUST

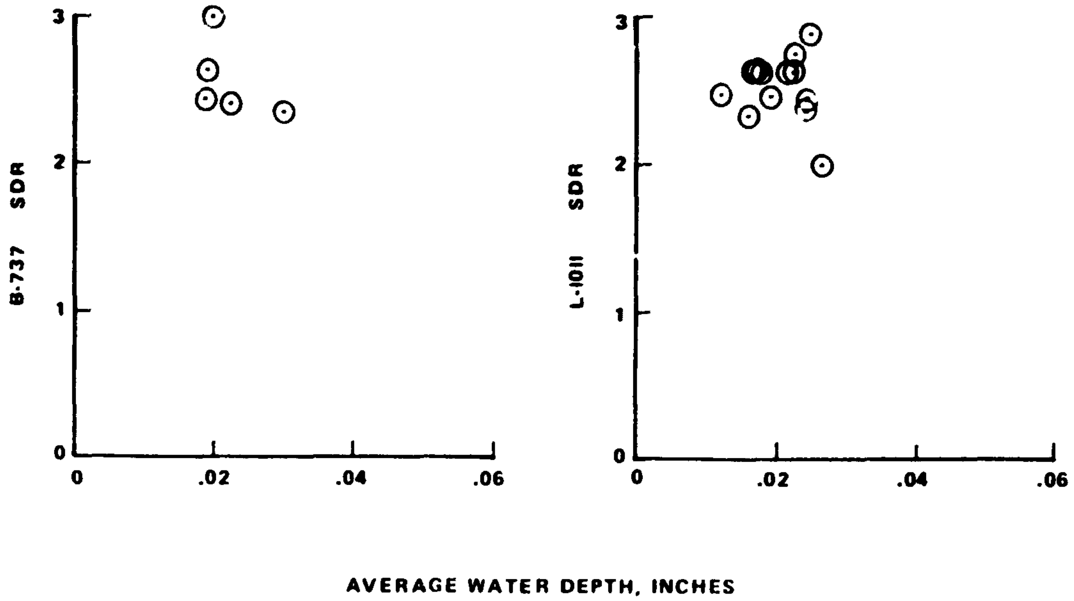


FIGURE 32
EFFECT OF WATER DEPTH ON
FRICTION VEHICLE MEASUREMENTS
L-1011 TESTS

FLAGGED SYMBOLS– FIRST TEST OF THE DAY–RUNWAY NOT FULLY SATURATED

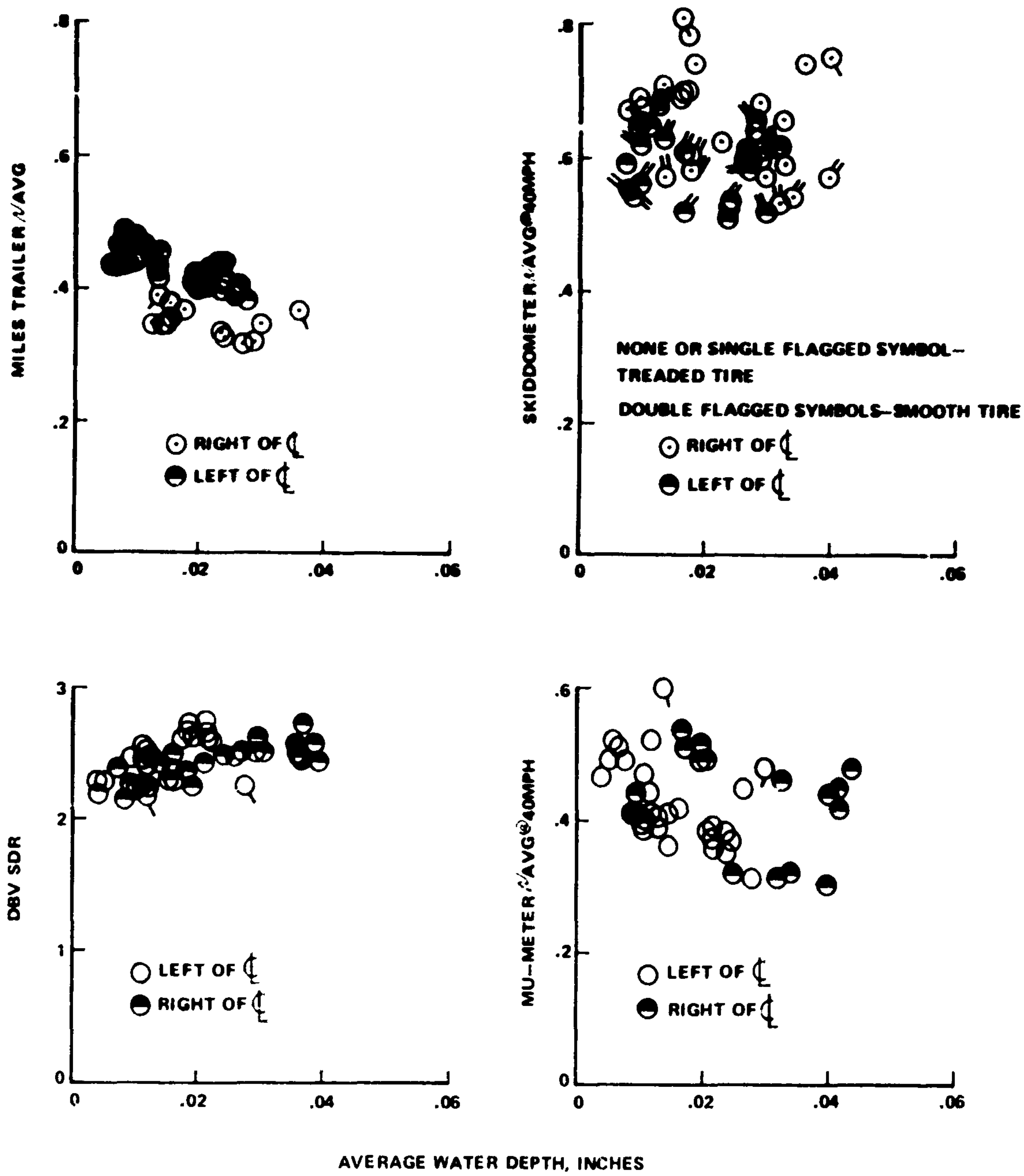


FIGURE 33
EFFECT OF WATER DEPTH ON
FRICTION VEHICLE MEASUREMENTS
B-737 TESTS

FLAGGED SYMBOLS INDICATE FIRST RUNS OF THE DAY. RUNWAY NOT SATURATED UNTIL 3rd TEST.

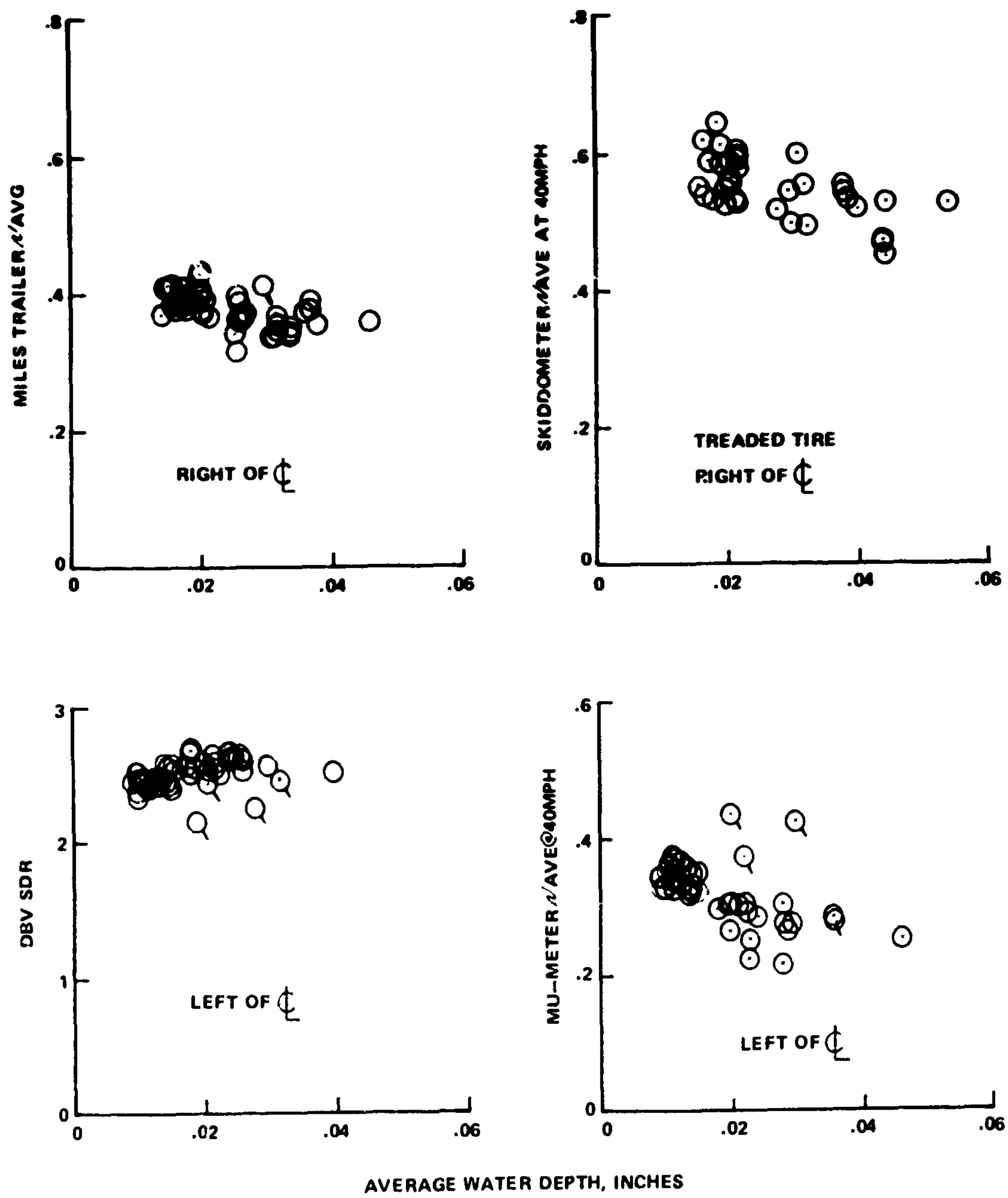


FIGURE 34
L–1011 – AIR TIME FROM 50 FT. TO TOUCHDOWN
VS
FLIGHT PATH ANGLE

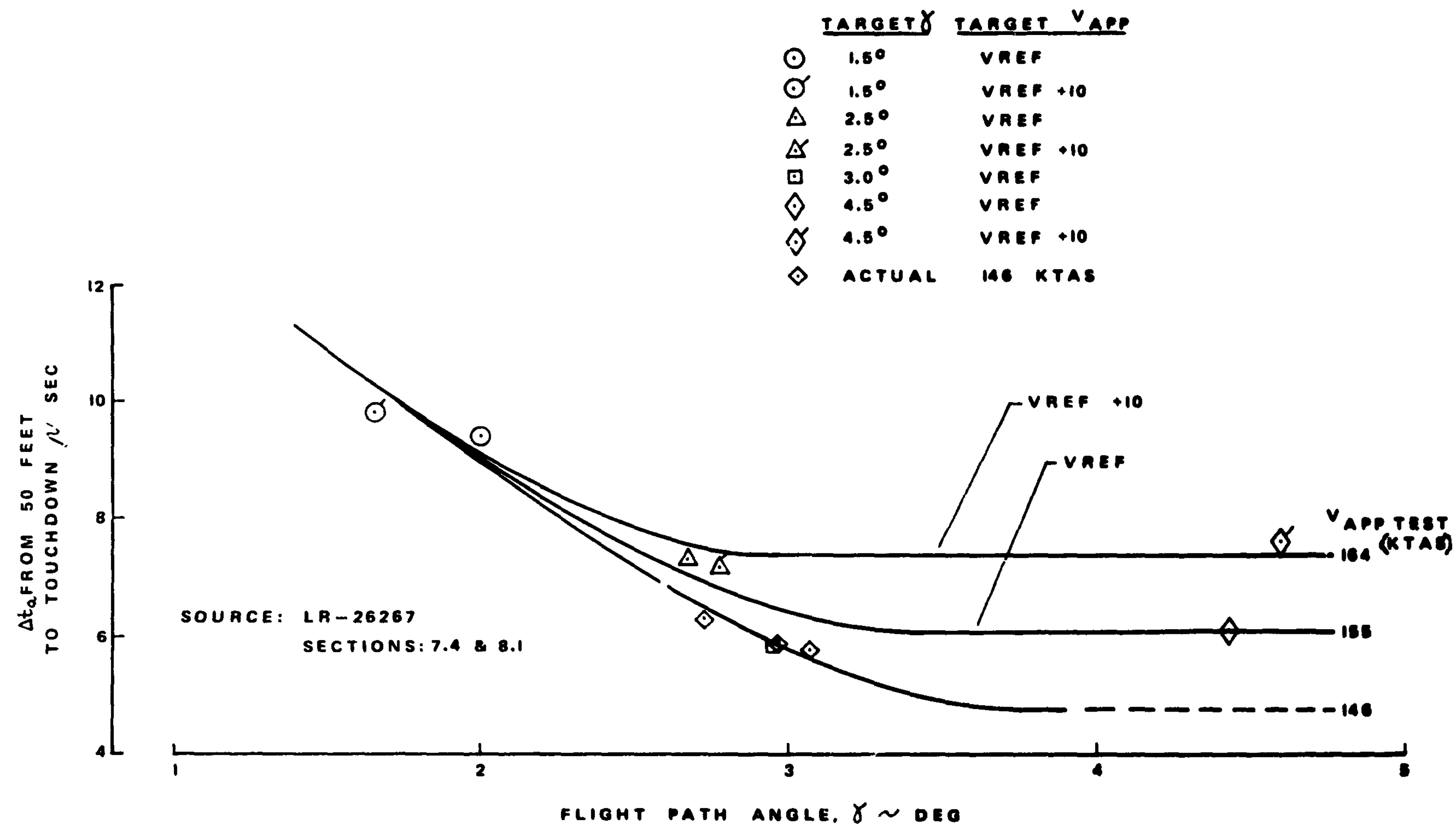


FIGURE 35
CROSS PLOT OF FIGURE 34

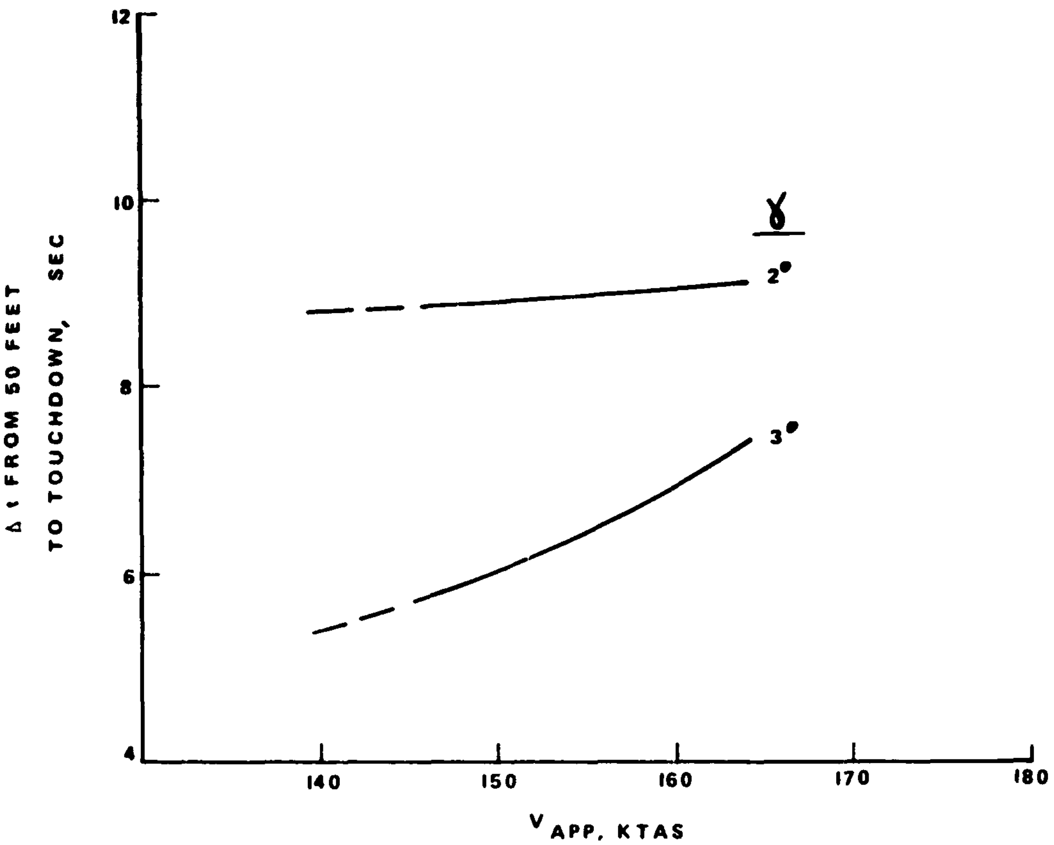


FIGURE 36
L-1011 SPEED BLEED FACTOR

TARGET γ	TARGET V_{APP}
⊙ 1.5°	VREF
⊙ 1.5°	VREF +10
△ 2.5°	VREF
△ 2.5°	VREF +10
⊡ 3°	VREF
◇ 4.5°	VREF
◇ 4.5°	VREF +10
◇ ACTUAL	146 KTS

SOURCE: LR-26267
SECTIONS 7.5 & 8.2

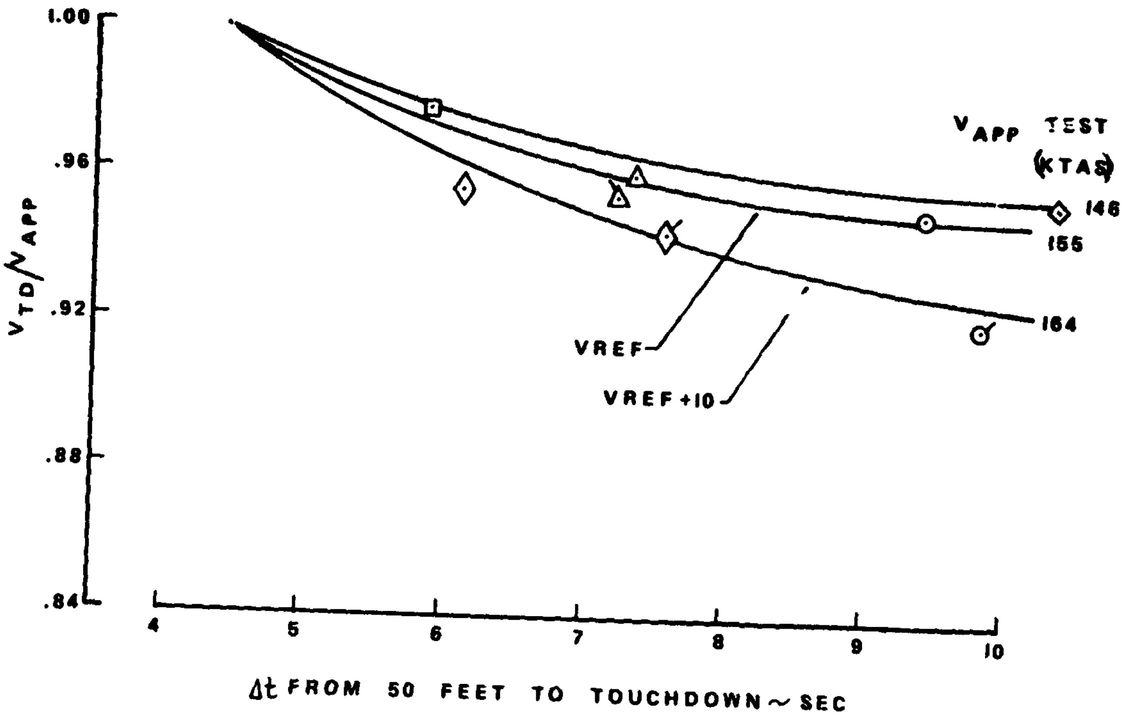


FIGURE 37

B-737 – FLIGHT PATH ANGLE (A), AND SPEED BLEED (B) AS A FUNCTION OF AIR TIME FROM 50 FT. TO TOUCHDOWN

SOURCE: BOEING D6-43078

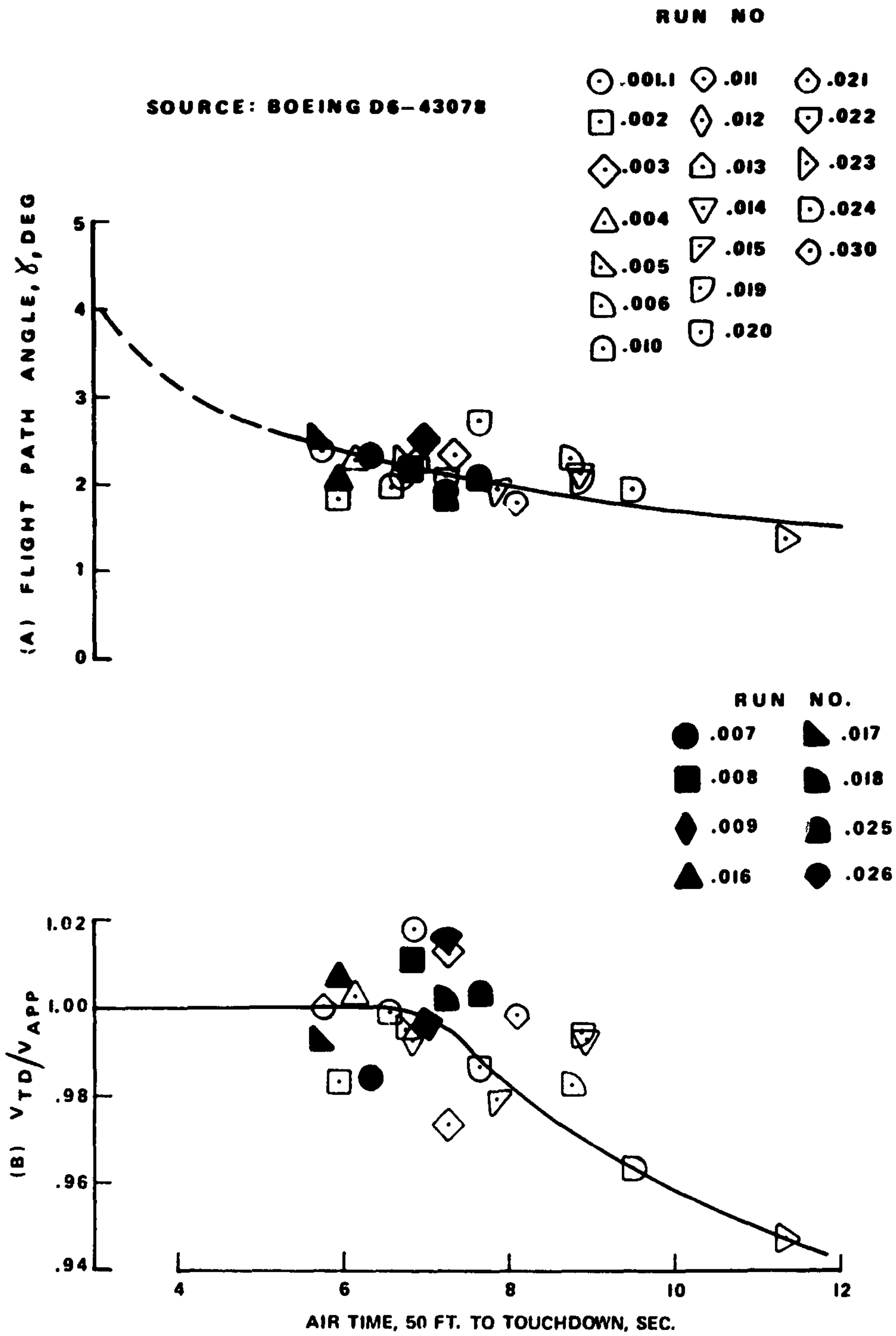


FIGURE 38
L-1011 – SPEED BLEED FACTOR DURING TRANSITION FROM TOUCHDOWN TO BRAKE APPLICATION

SOURCE: LR- 26267 P. 8.2-6

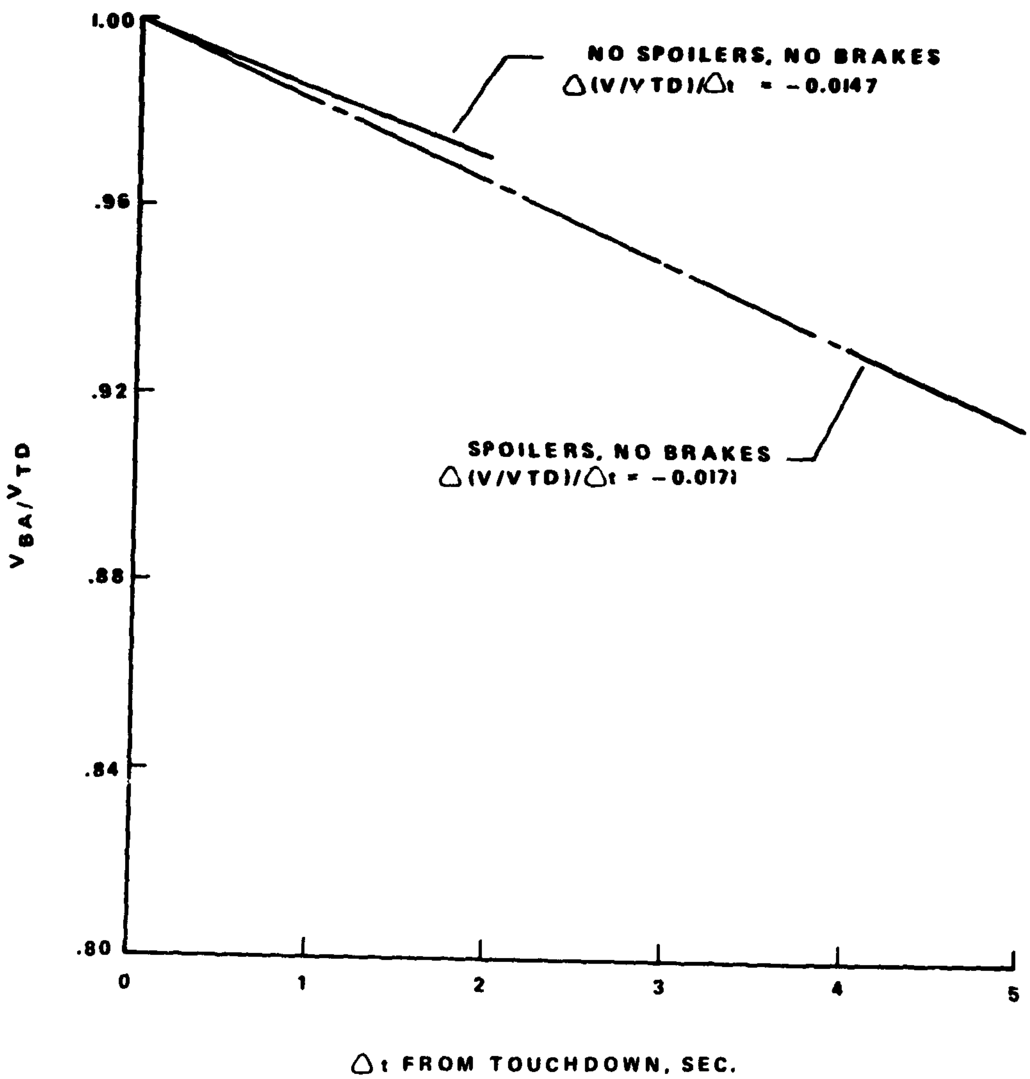


FIGURE 39

B-737 – SPEED BLEED FACTOR DURING THE TRANSITION FROM TOUCHDOWN TO BRAKE APPLICATION

SOURCE: BOEING D6-43078 P.10, 11, 12 & 13

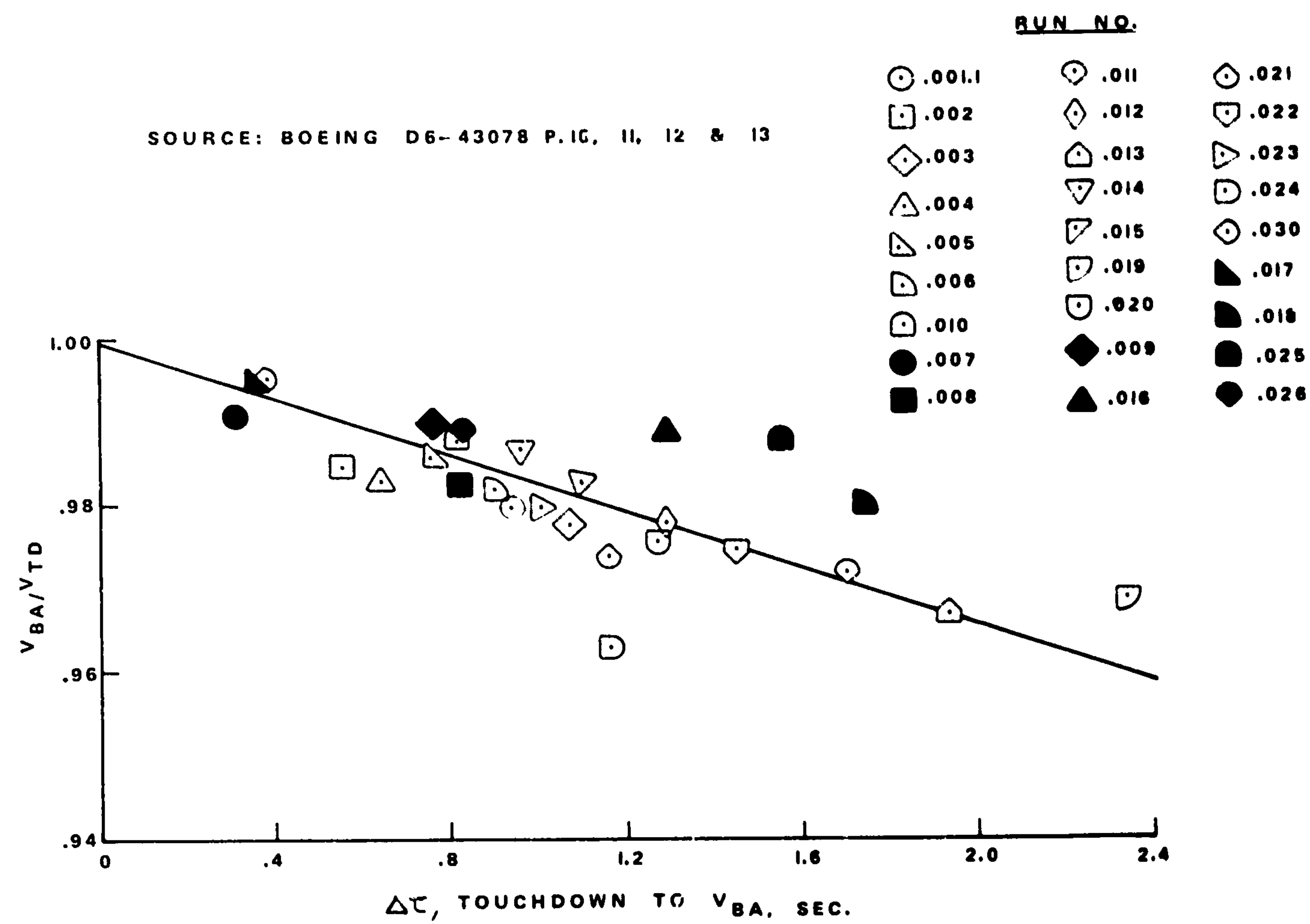


FIGURE 40
L–1011 STOPPING DISTANCE AS A
FUNCTION OF ENERGY, WV^2_{BG}

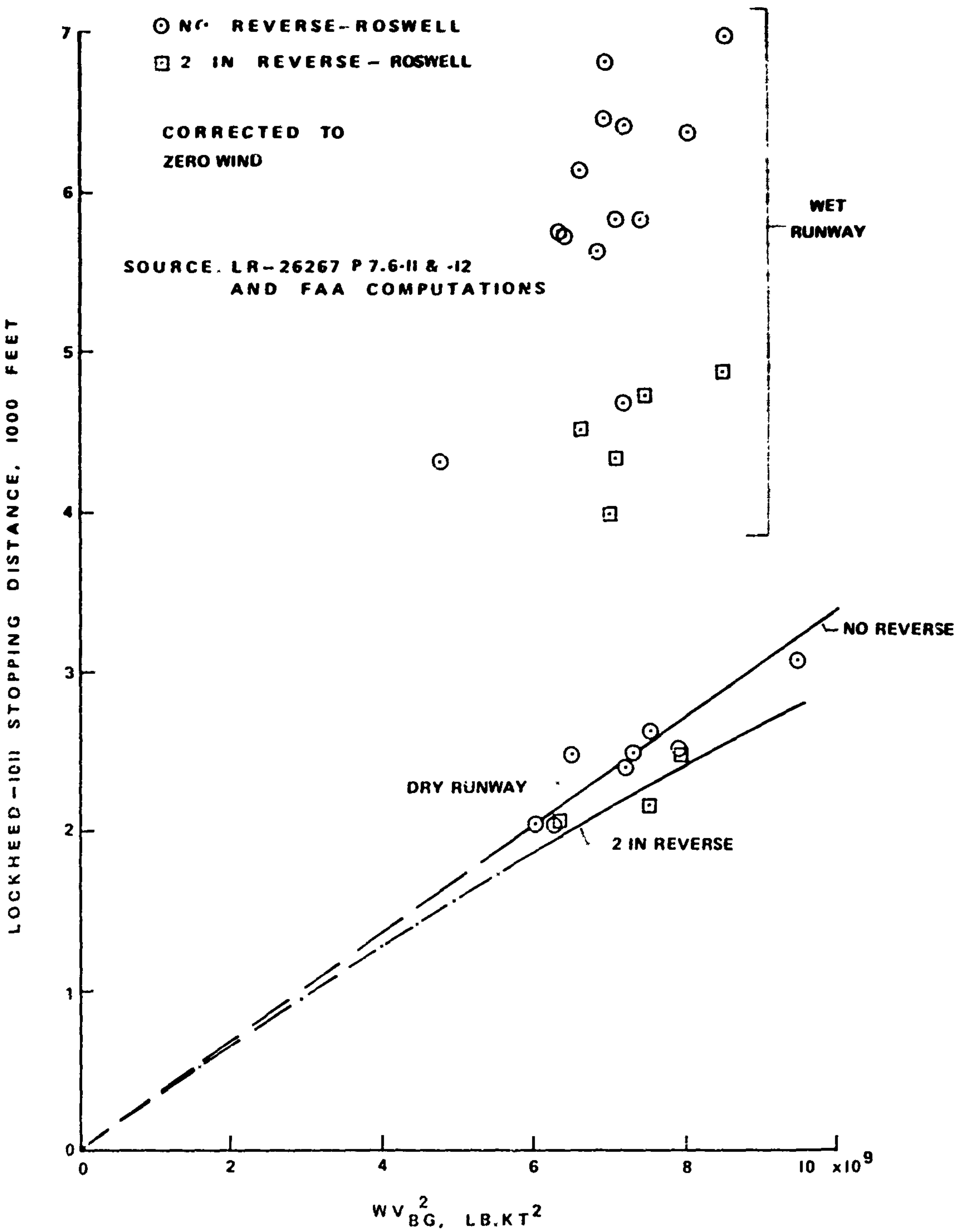


FIGURE 41

B-737 STOPPING DISTANCE AS A FUNCTION OF ENERGY, WV^2_{BG}

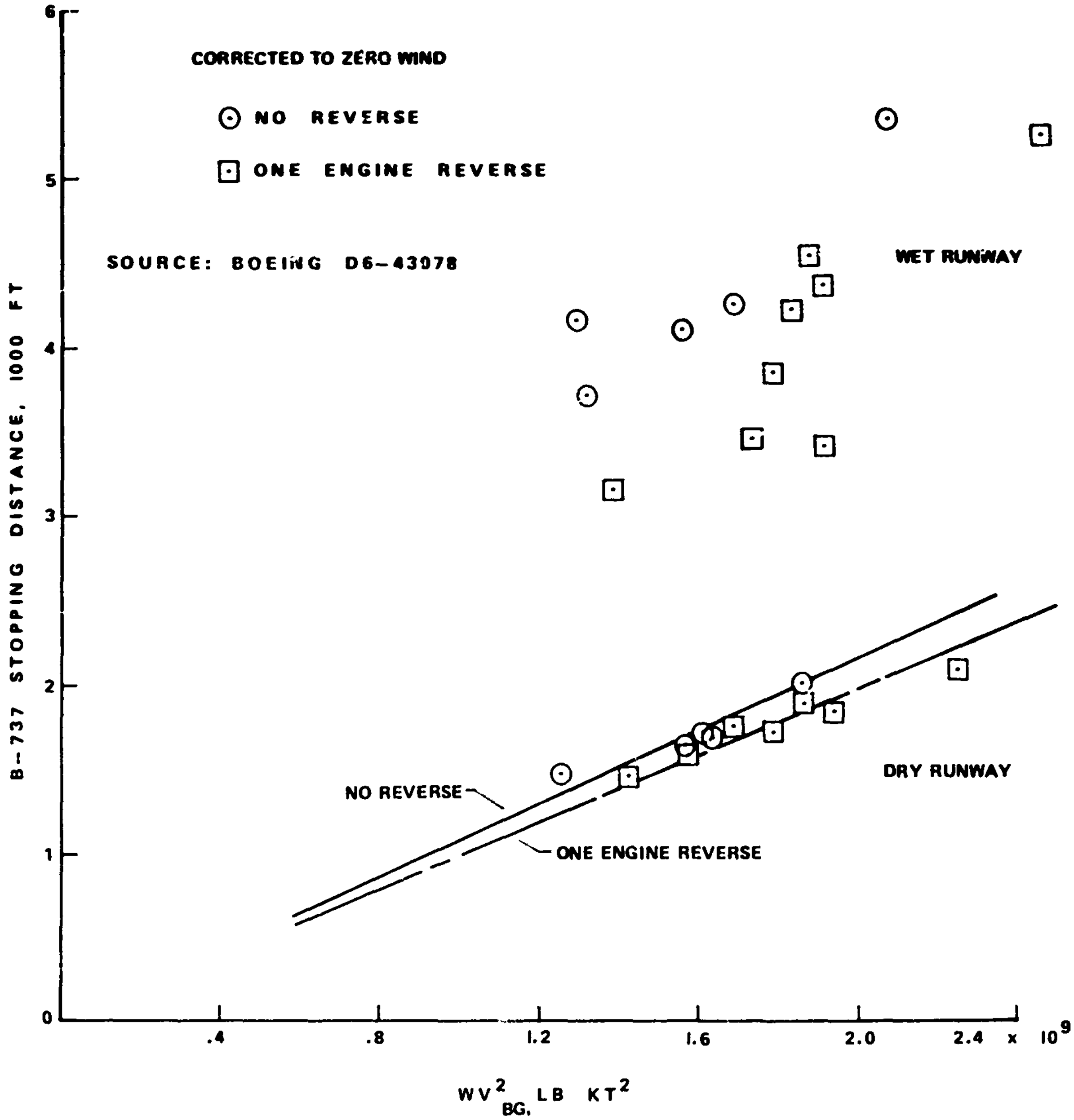


FIGURE 42
L-1011 EFFECTIVE BRAKING FRICTION COEFFICIENT
μ_B AS A FUNCTION OF ENERGY, WV^2_{BG}

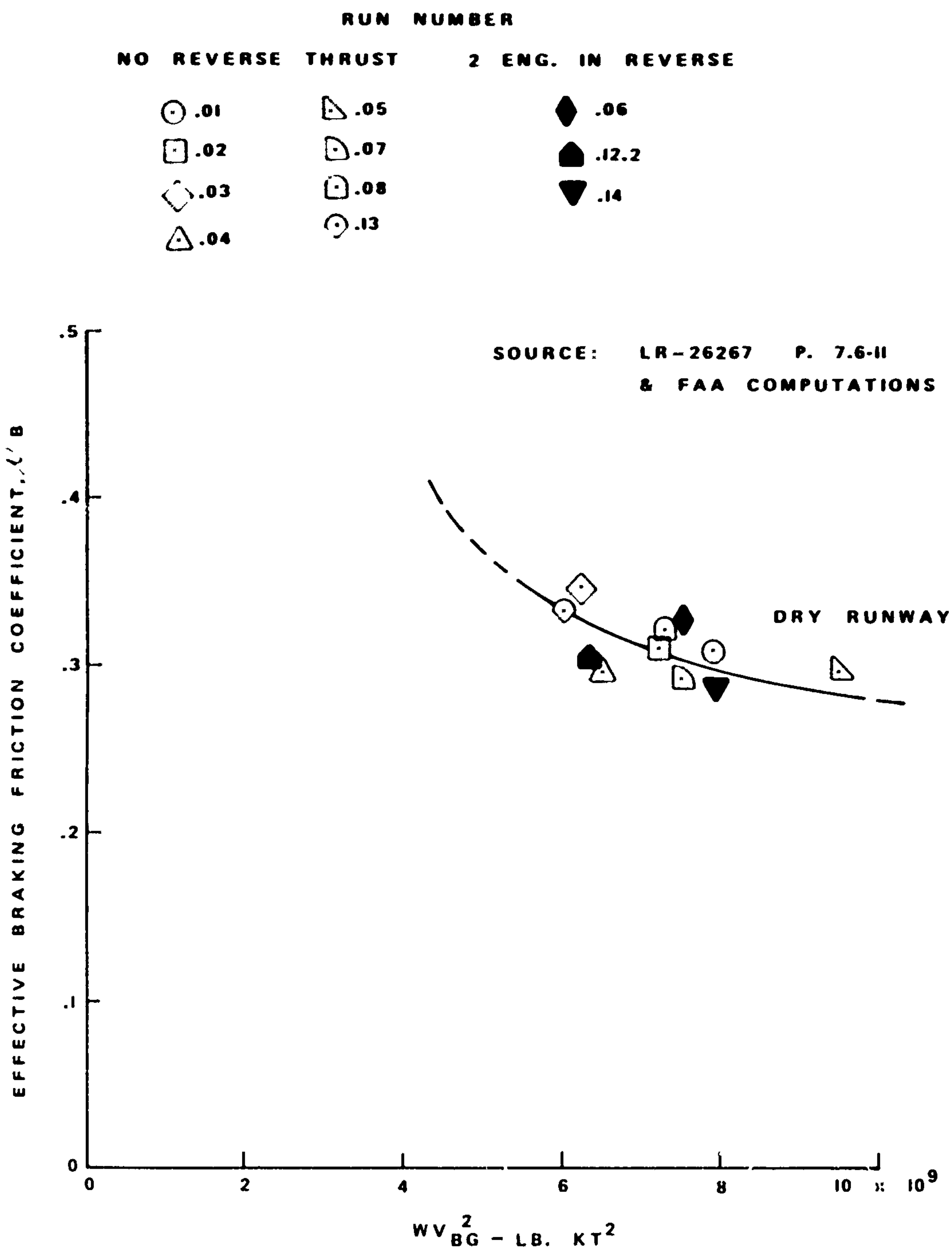


FIGURE 43

B-737 EFFECTIVE BRAKING FRICTION COEFFICIENT μ_B AS A FUNCTION OF ENERGY, WV^2_{BG}

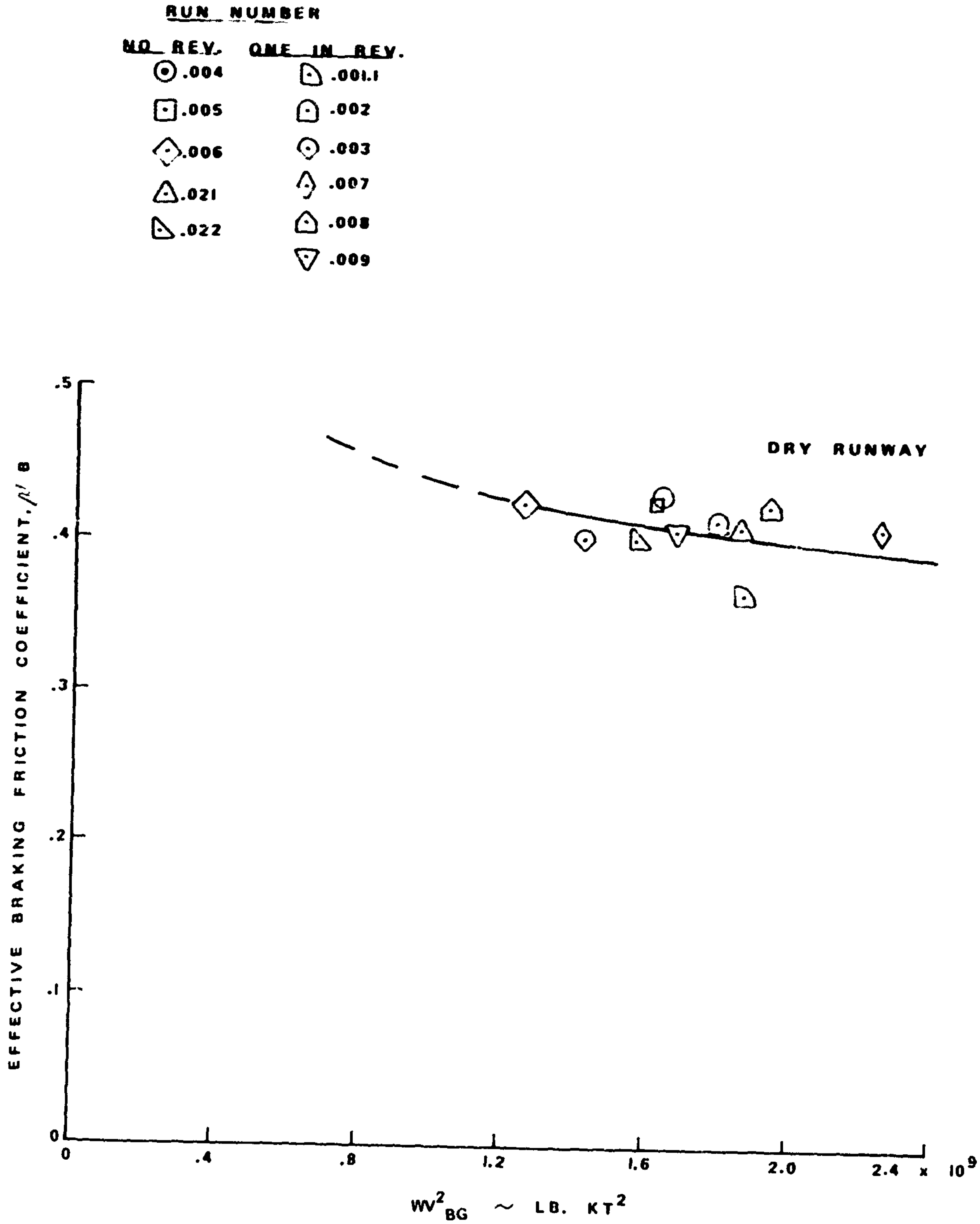


FIGURE 44

L-1011 RELATIONSHIP OF V_{BA} TO

$V_{MAX. REV.}$ FOR SEVERAL GROSS WEIGHTS

SOURCE: LR 26.267 P. 8.4 – 15, – 16, – 17

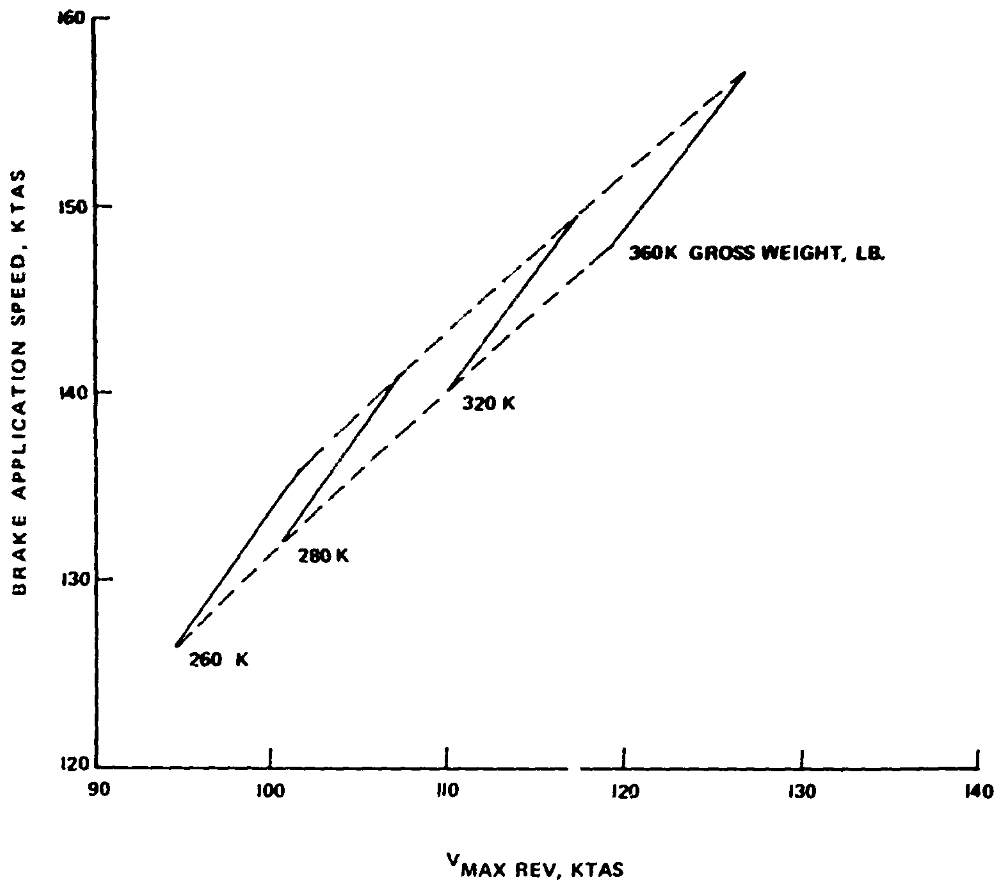


FIGURE 45
L-1011 AVERAGE REVERSE THRUST AS
A FUNCTION OF VELOCITY AT MAX. REVERSE

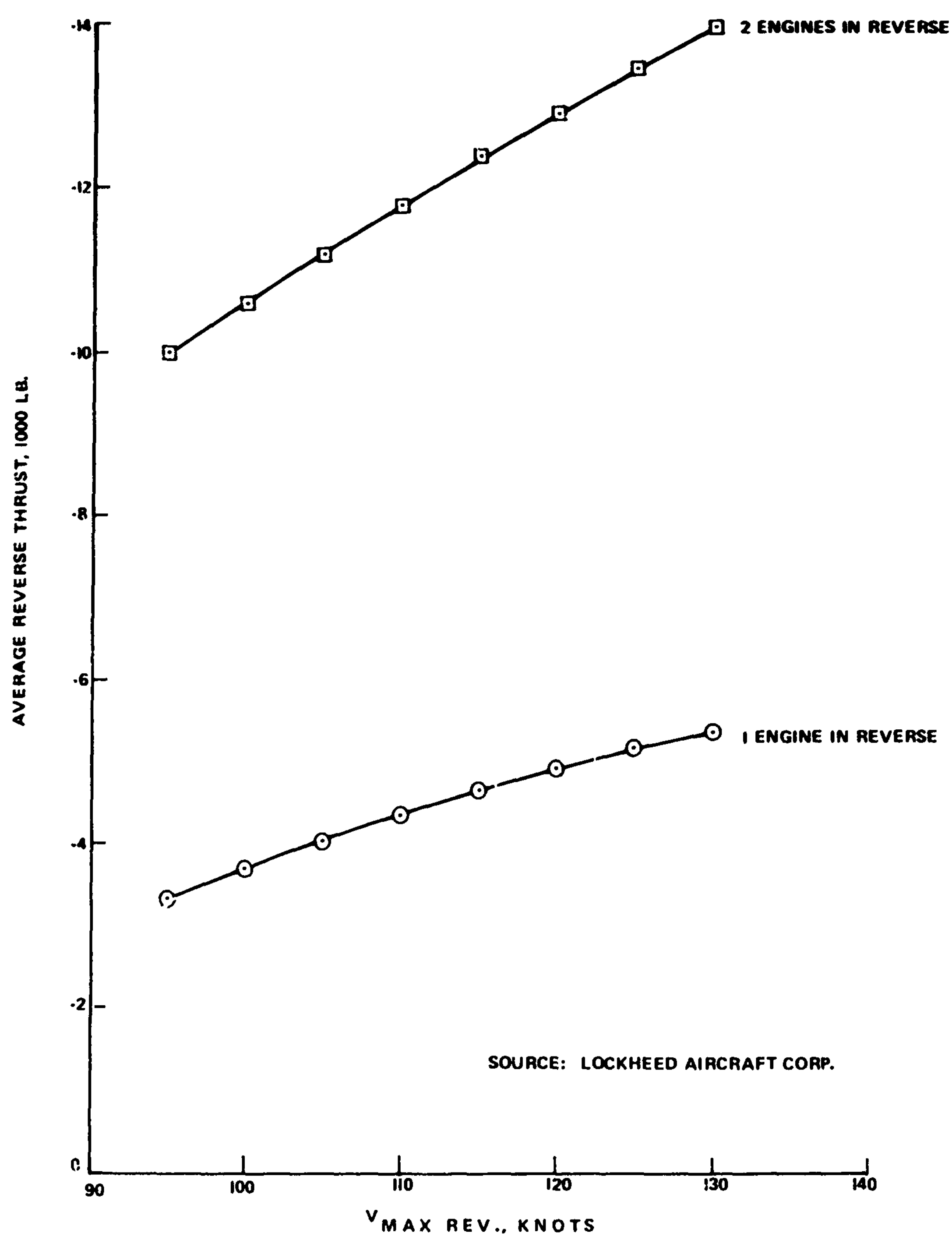


FIGURE 46
STOPPING DISTANCE CORRELATION – L-1011
TWO ENGINES REVERSE, MAXIMUM ANTI-SKID BRAKING

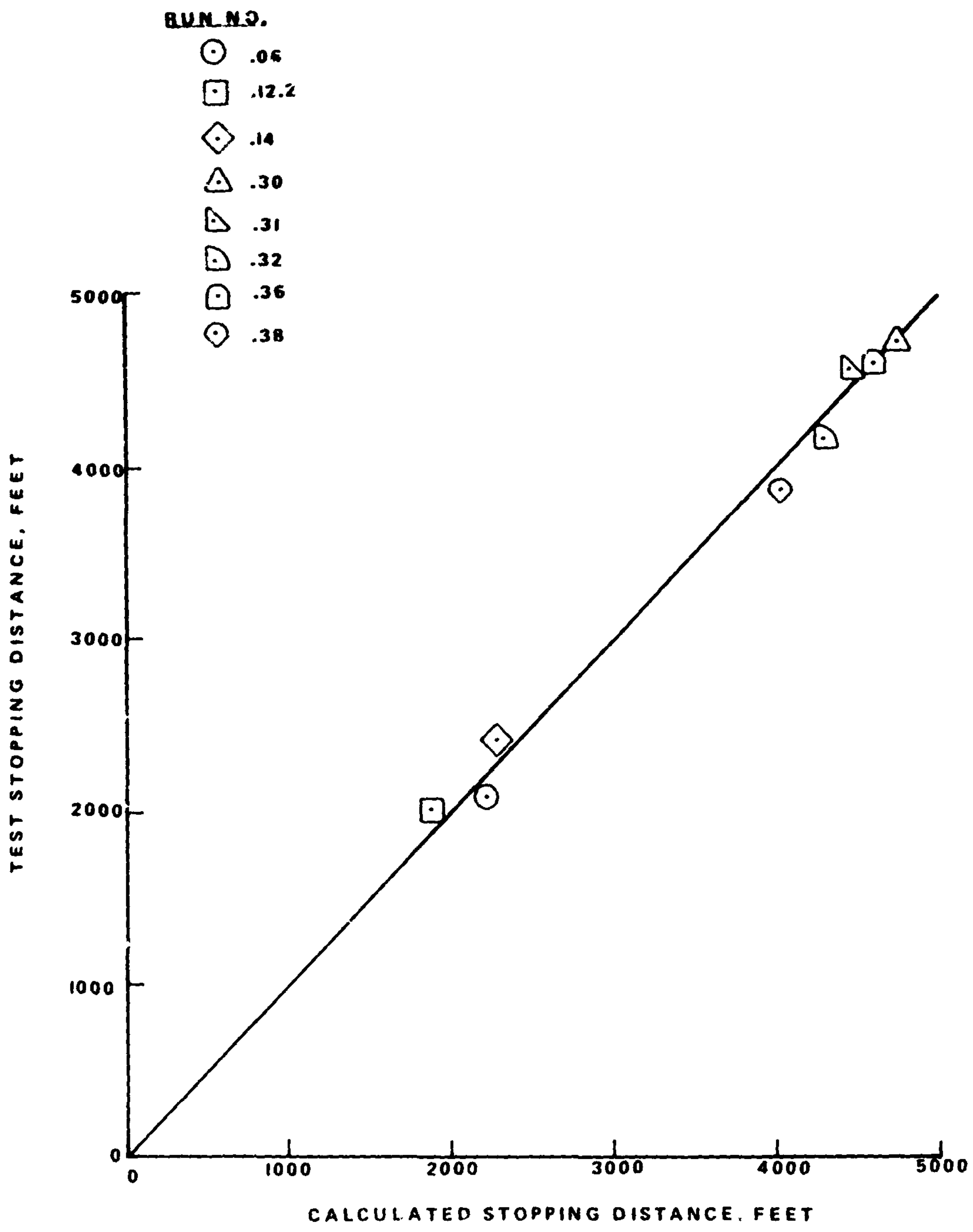


FIGURE 47
L–1011 STOPPING DISTANCE RATIO
AS A FUNCTION OF μ_B DRY/μ_B WET

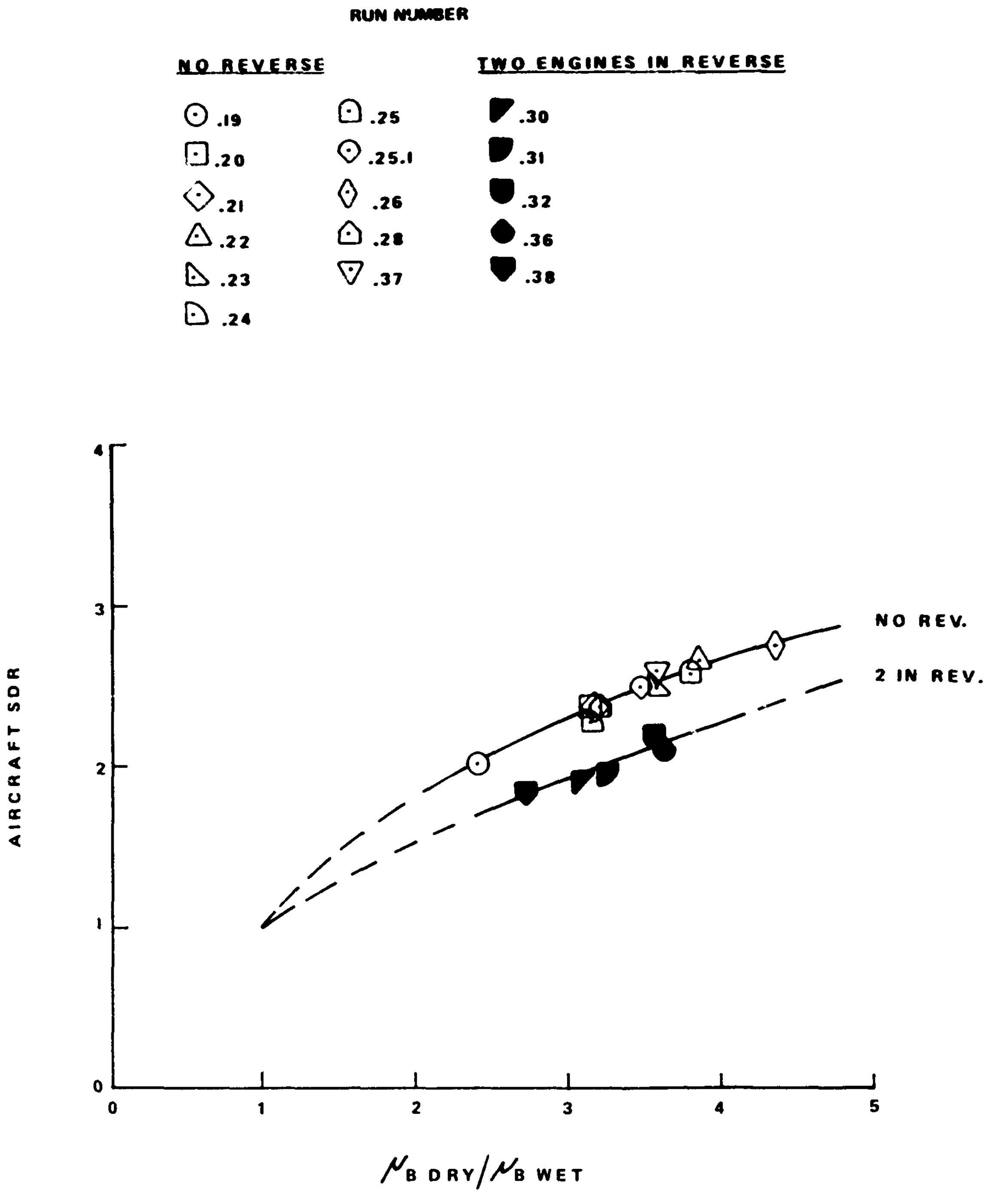


FIGURE 48

B-737– STOPPING DISTANCE RATIO
AS A FUNCTION OF μB DRY/μB WET

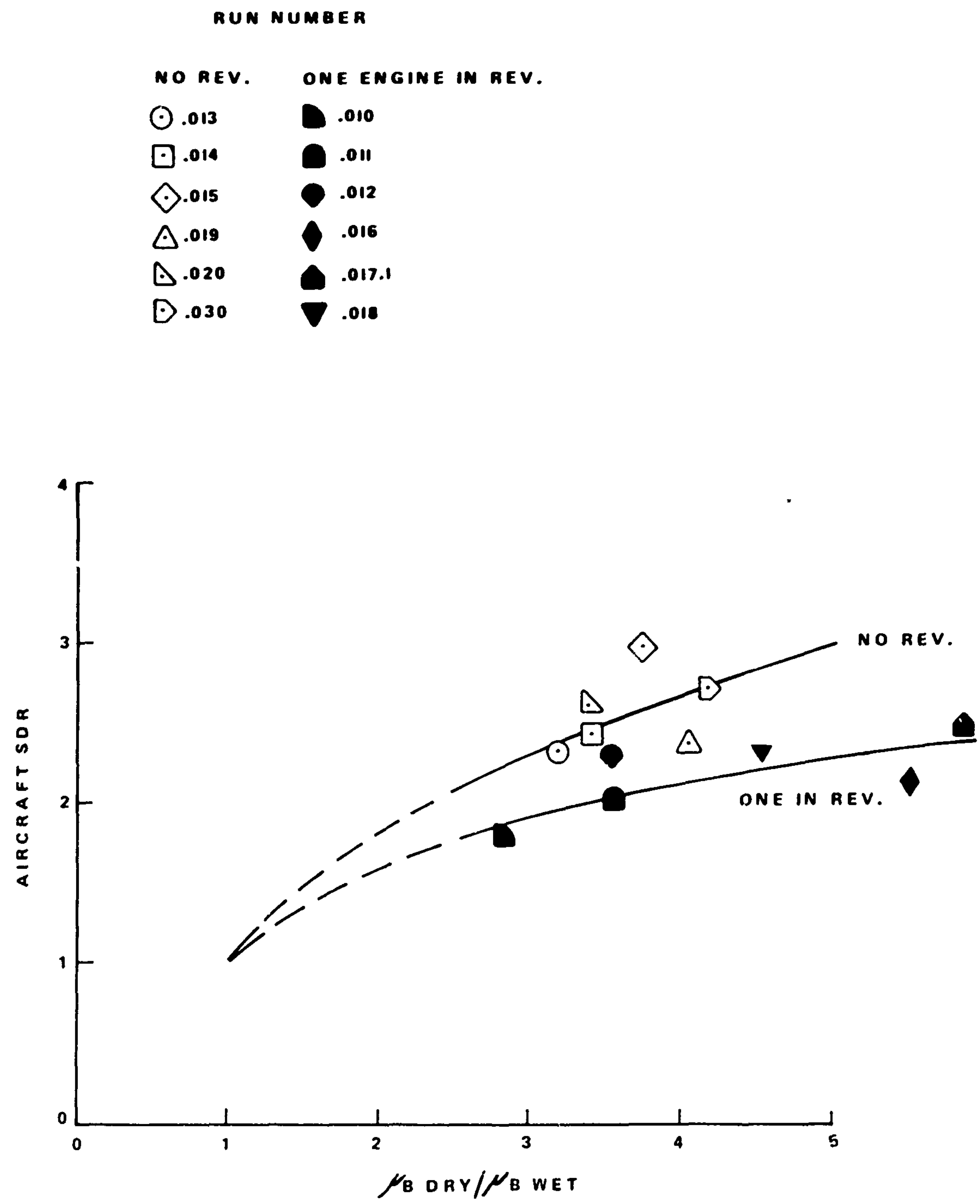


FIGURE 49

B-737 AIRCRAFT TIRE TEST PROGRAM

5- GROOVE, 40 x 14 – 16, TYPE 7 MAIN GEAR TIRE; P=165 PSI

F z ≃20,00LB

CONCRETE SURFACES; AVERAGE WATER DEPTH =0.01 TO 0.03 IN.

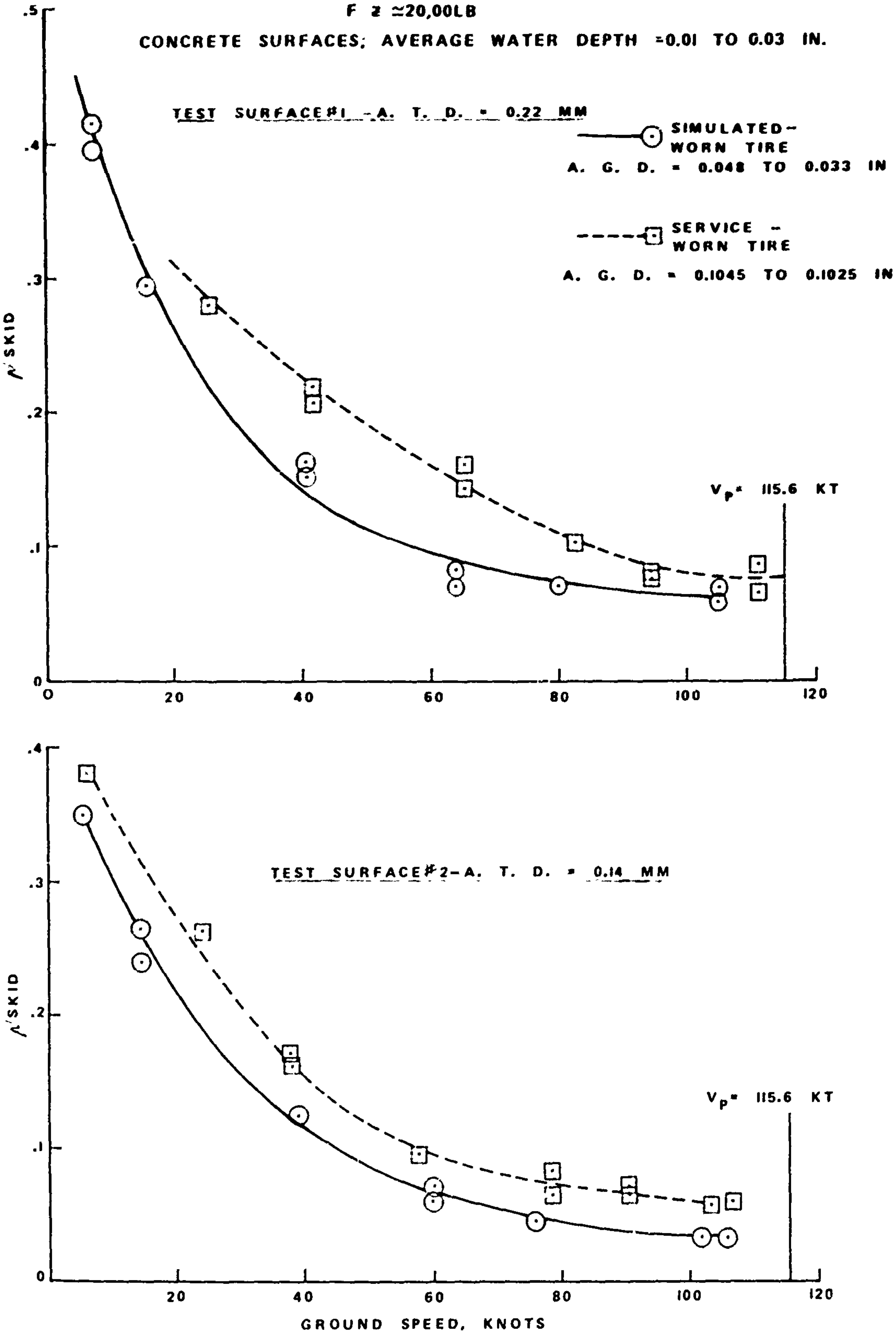
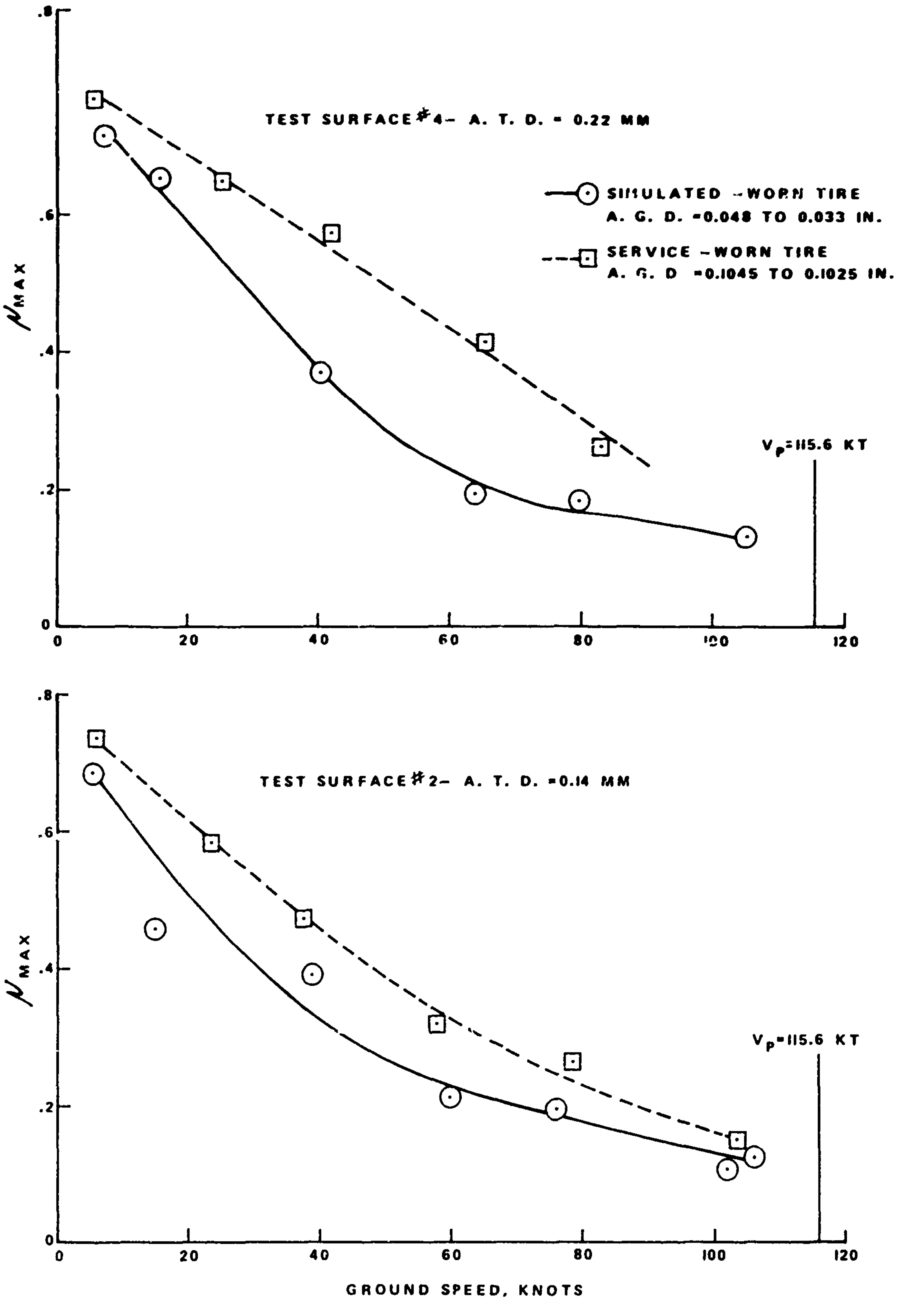


FIGURE 50

5-GROOVE, 40 x 14-16, TYPE 7 MAIN GEAR TIRE; P= 165 LB/IN^2; $F_Z \approx$ 20,000 LB
CONCRETE SURFACES; AVERAGE WATER DEPTH=0.01 TO 0.03 IN.



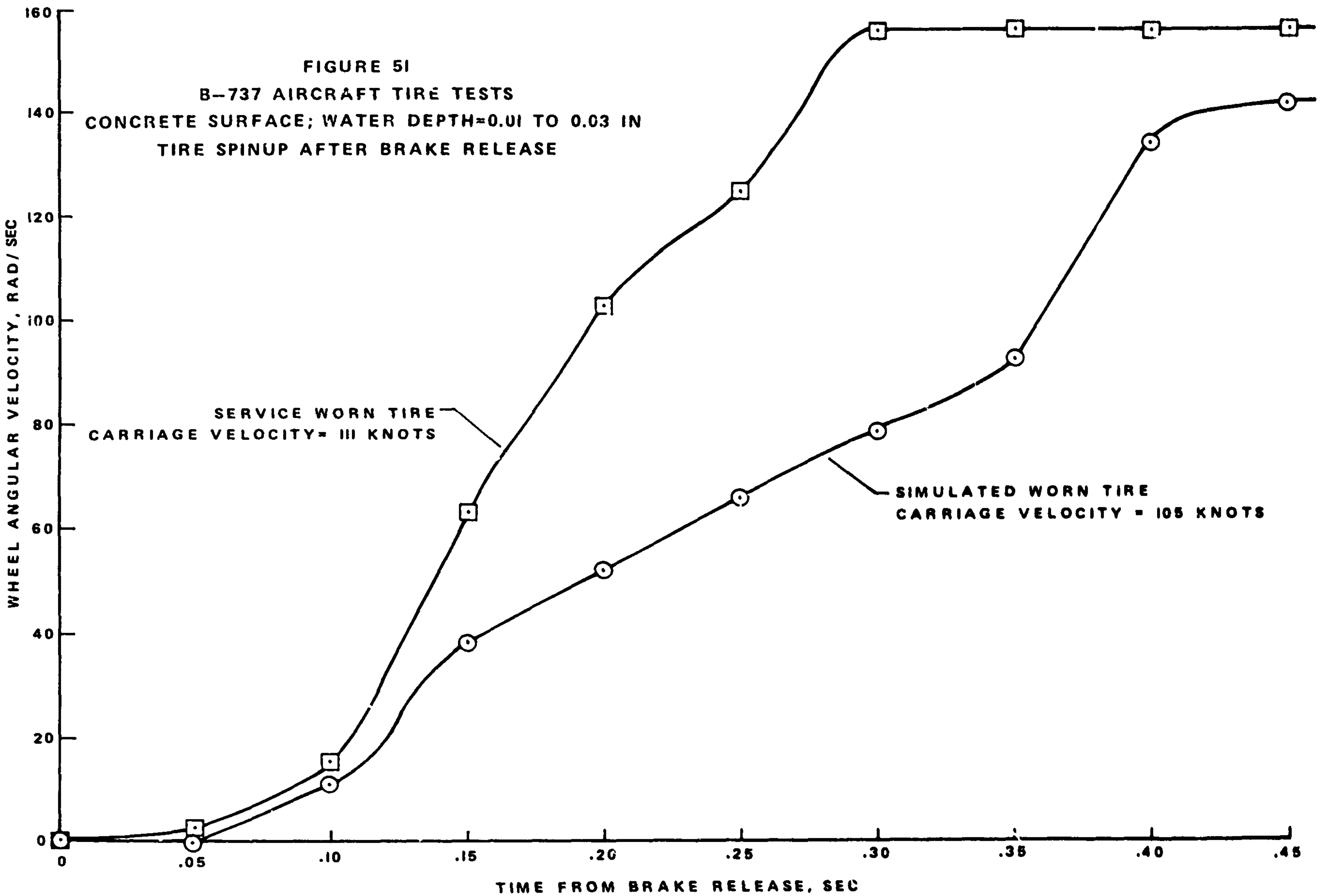


FIGURE 51
B-737 AIRCRAFT TIRE TESTS
CONCRETE SURFACE; WATER DEPTH=0.01 TO 0.03 IN
TIRE SPINUP AFTER BRAKE RELEASE

FIGURE 52

COMPARISON OF EFFECTIVE BRAKING FRICTION COEFFICIENT

WITH μSKID AND μMAX – CONDITION L20.004.013

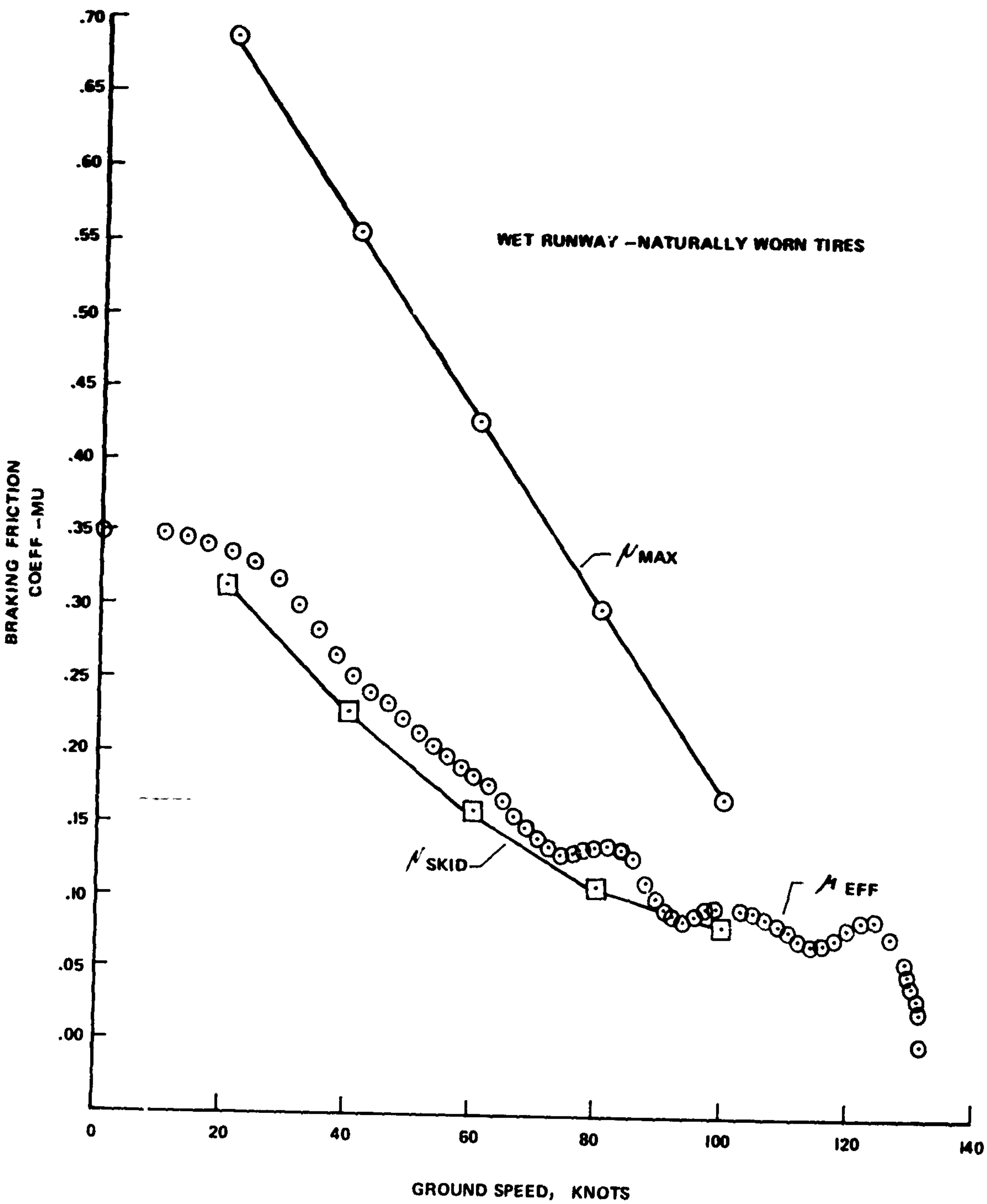


FIGURE 53
COMPARISON OF EFFECTIVE BRAKING FRICTION COEFFICIENT WITH μSKID AND μMAX—CONDITION L20.004.014

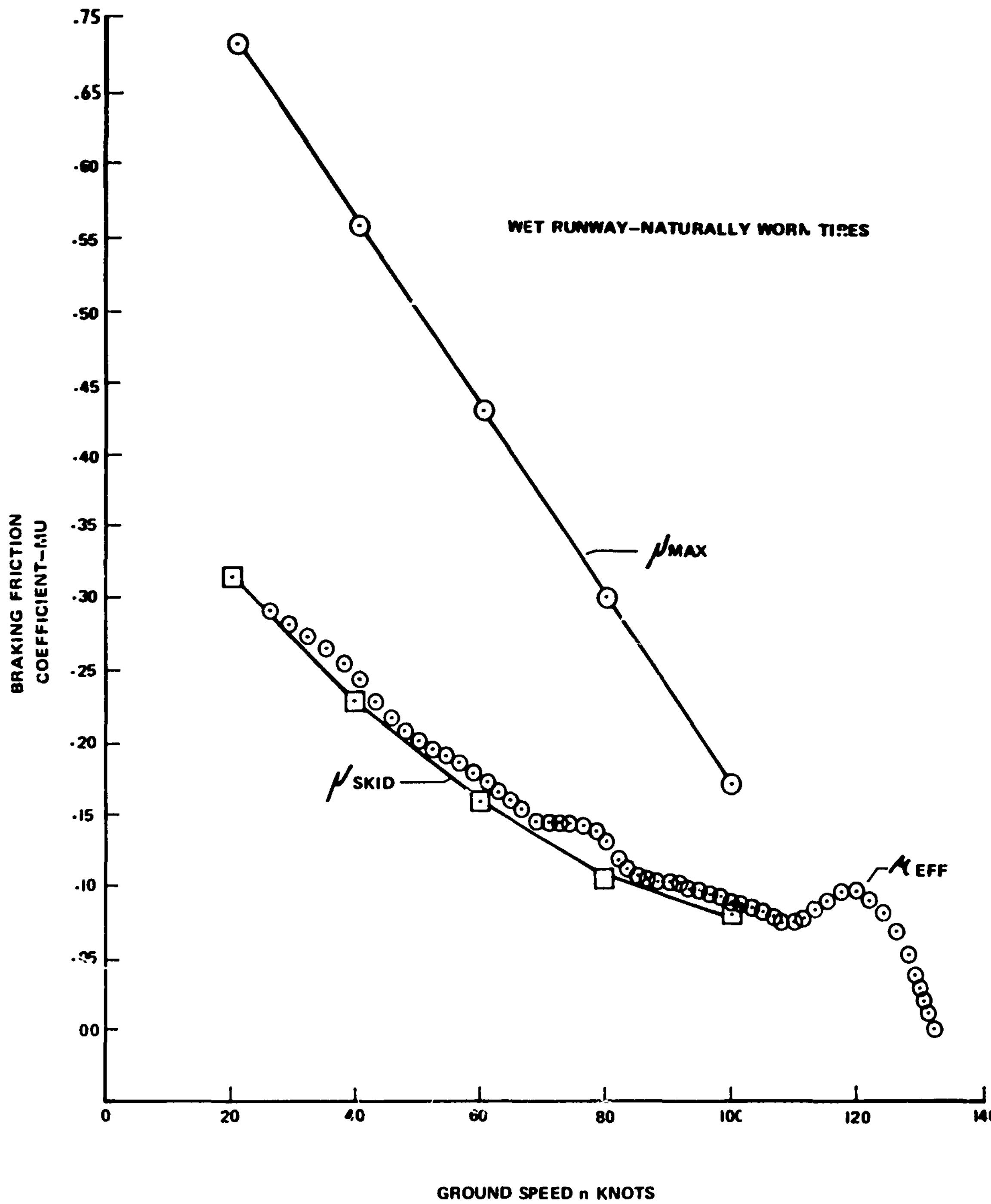


FIGURE 54

COMPARISON OF EFFECTIVE BRAKING FRICTION COEFFICIENT WITH μ SKID AND μ MAX – CONDITION I.20.004.015

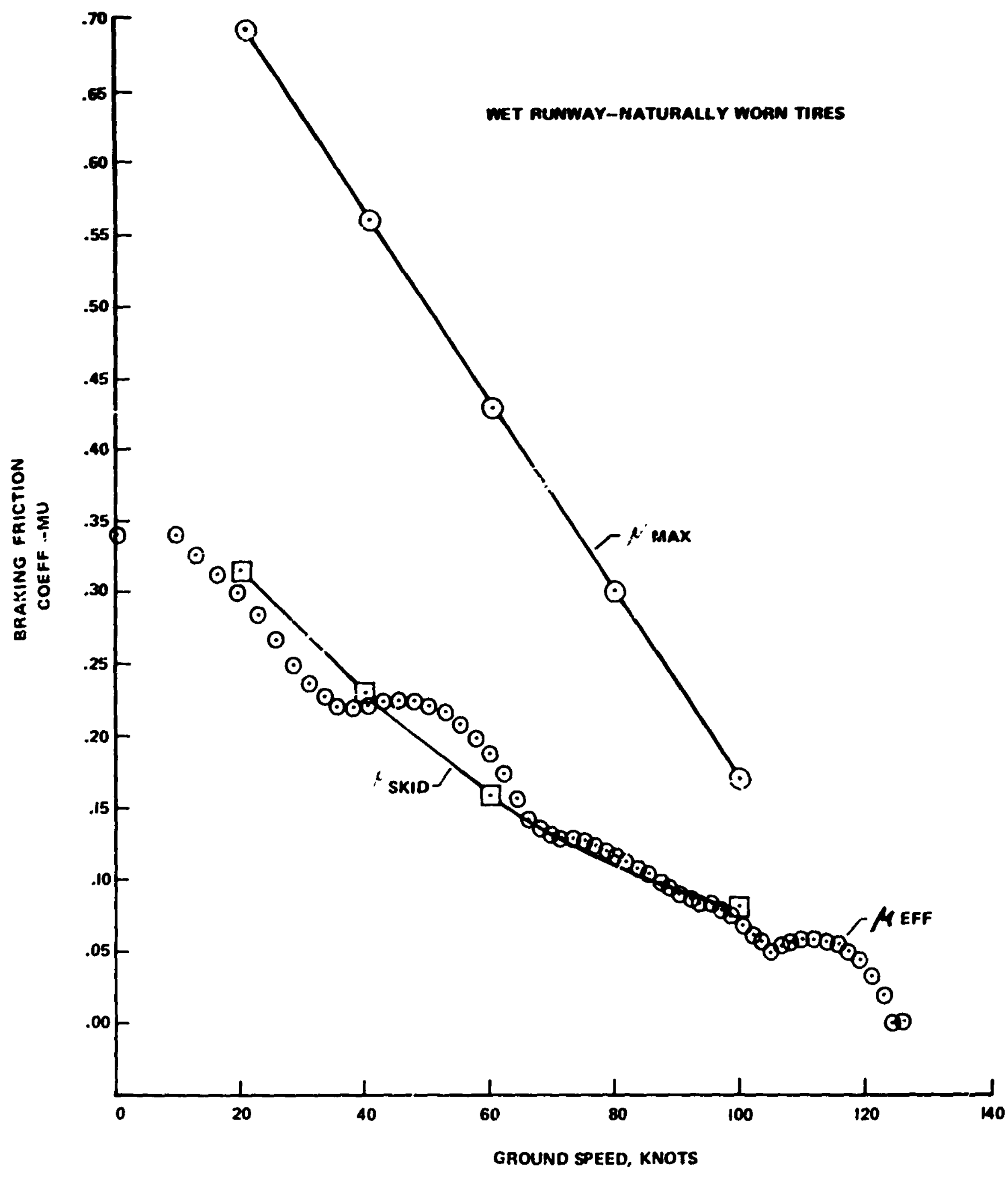


FIGURE 55

COMPARISON OF EFFECTIVE BRAKING FRICTION COEFFICIENT WITH μ_{SKID} AND μ_{MAX} — CONDITION I.20.004.019

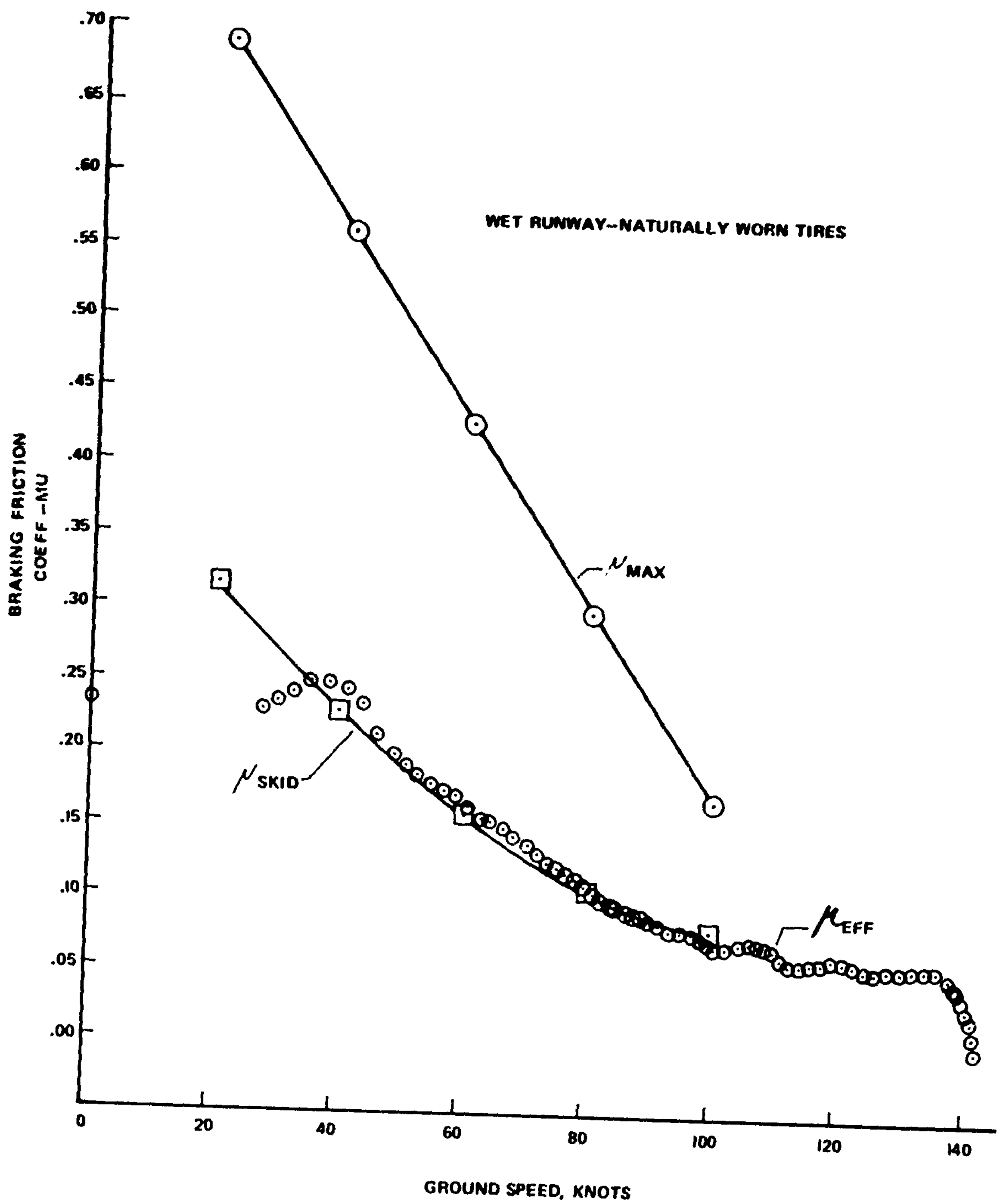


FIGURE 56

COMPARISON OF EFFECTIVE BRAKING FRICTION COEFFICIENT WITH μSKID AND μMAX – CONDITION 1.20.004.020

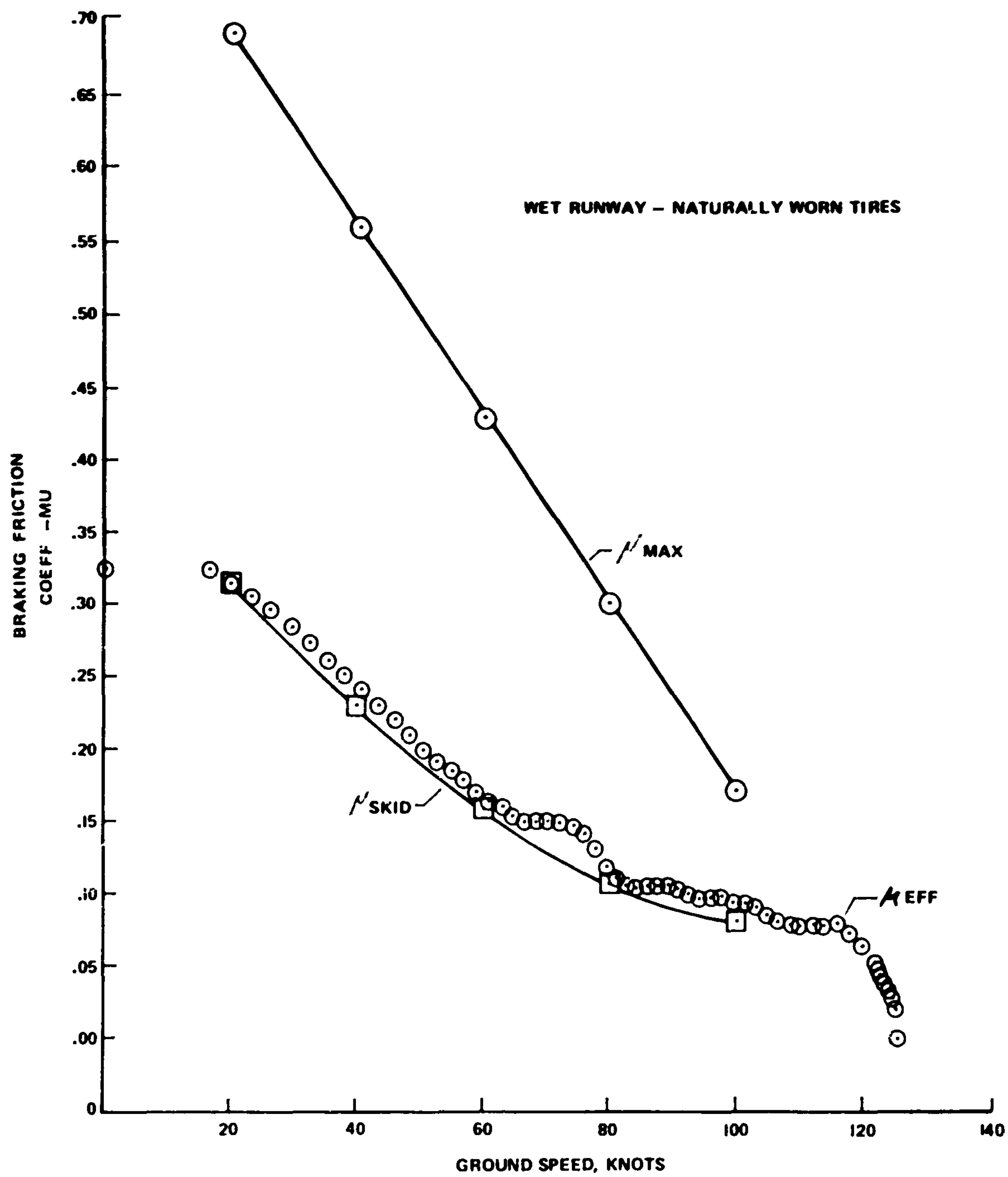


FIGURE 57
COMPARISON OF EFFECTIVE BRAKING FRICTION COEFFICIENT
WITH μ SKID AND μ MAX – CONDITION L20.004.030

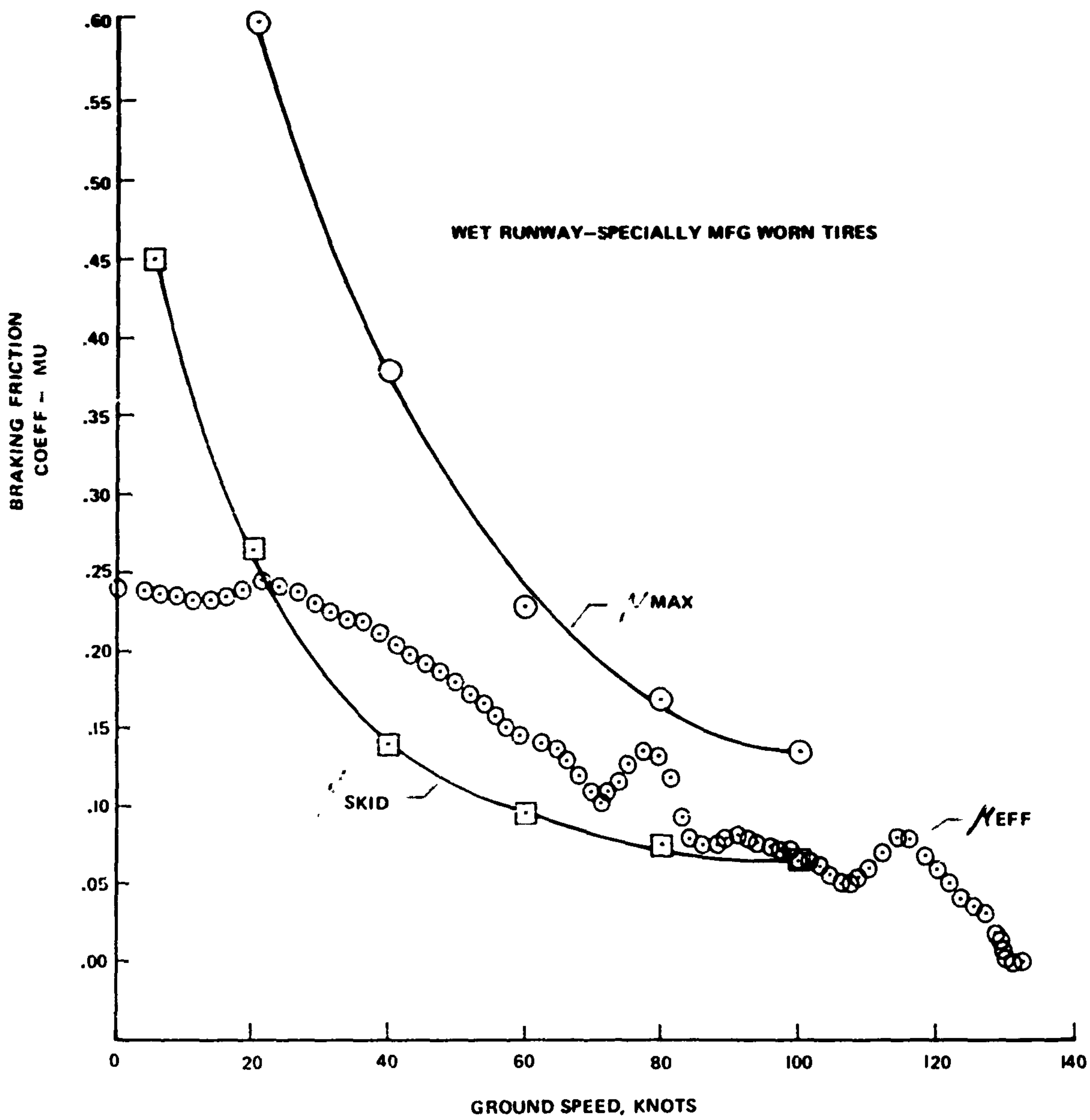


FIGURE 58
COMPARISON OF EFFECTIVE BRAKING COEFFICIENT
WITH μSKID AND μMAX – CONDITION L20.004.031

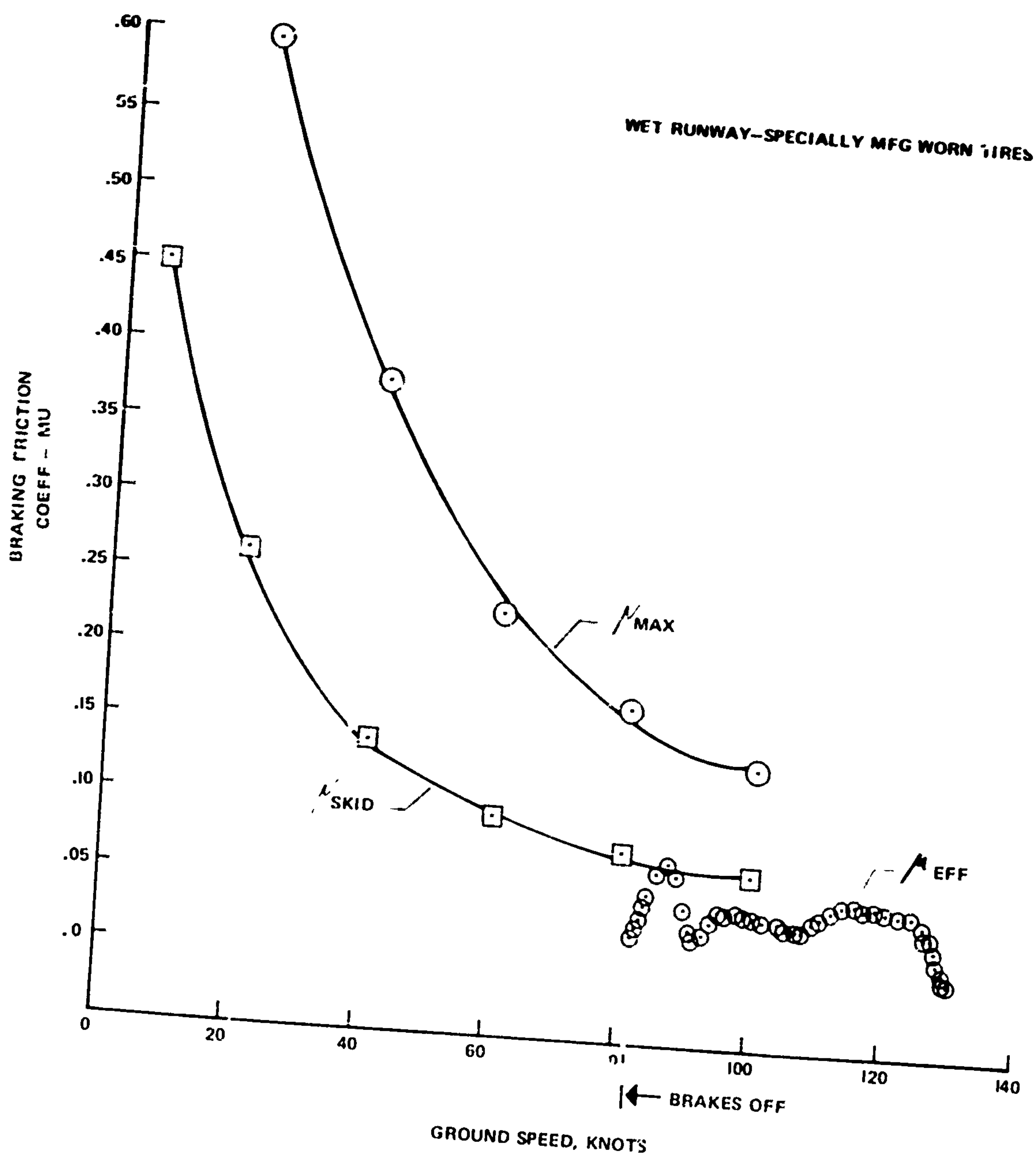


FIGURE 59

COMPARISON OF EFFECTIVE BRAKING FRICTION COEFFICIENT
WITH μ SKID AND μ MAX – CONDITION L20.004.033

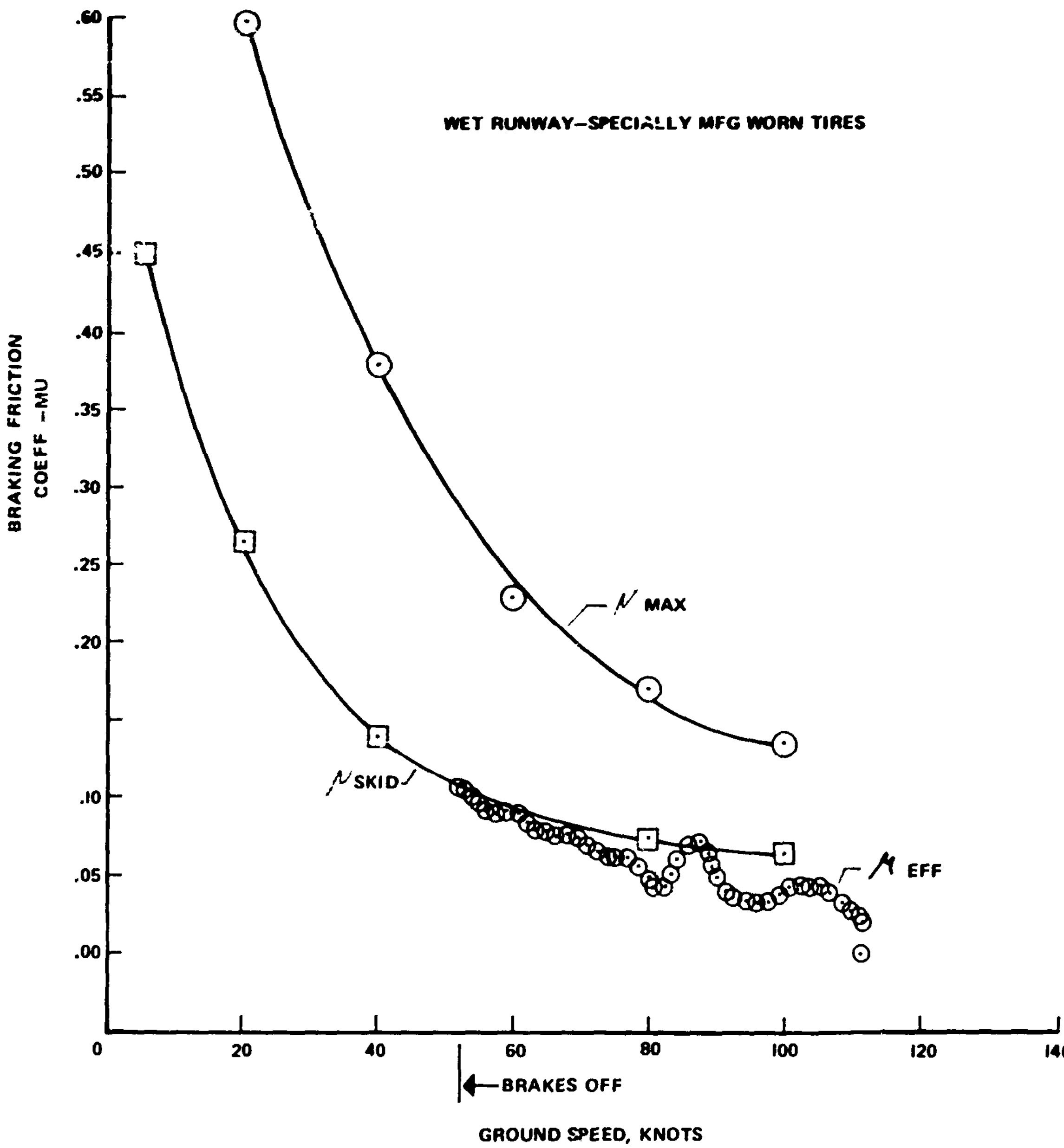


FIGURE 60

COMPARISON OF EFFECTIVE BRAKING FRICTION COEFFICIENT WITH μ SKID AND μ MAX – CONDITION I.20.004.035

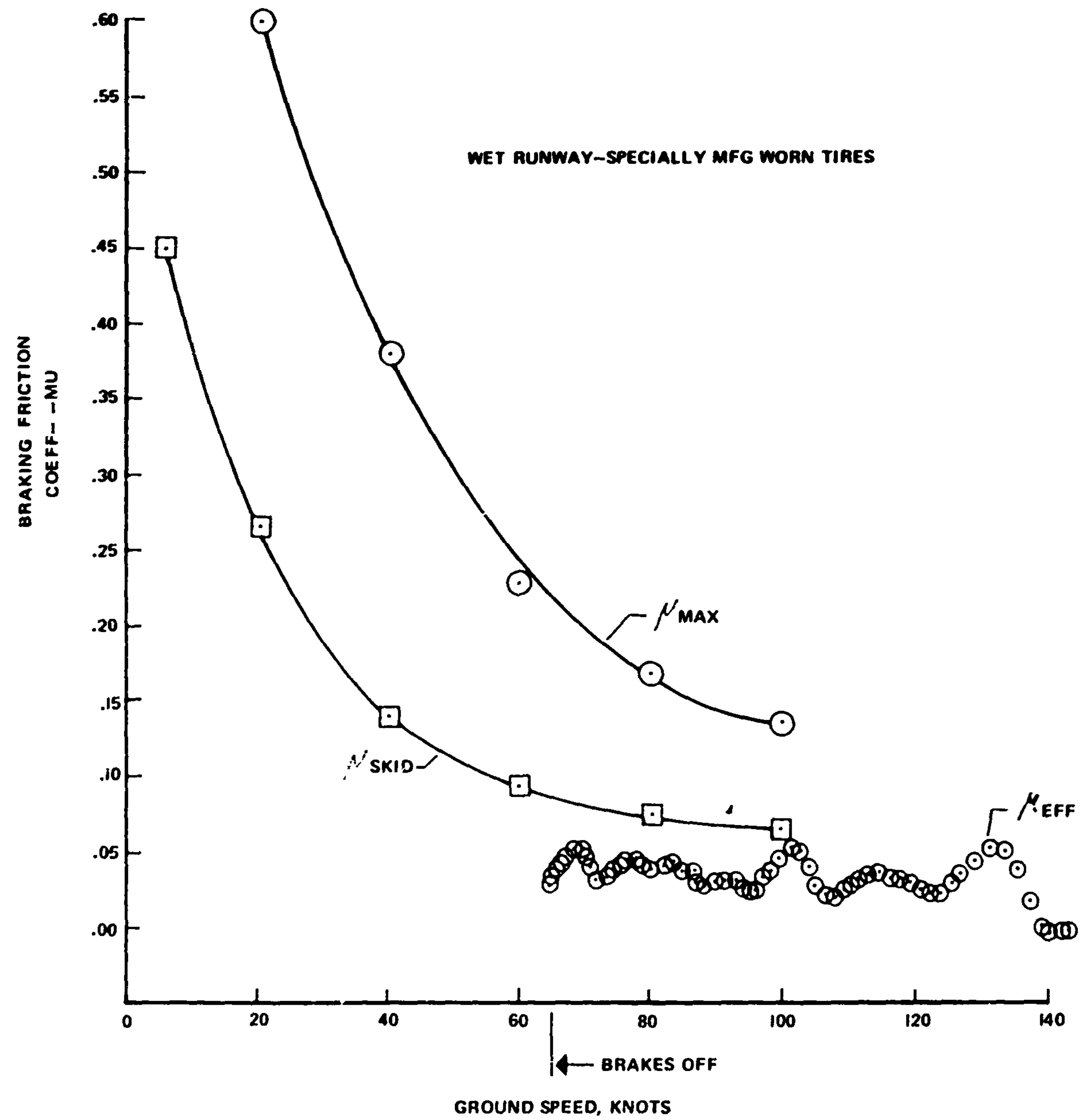


FIGURE 61

COMPARISON OF EFFECTIVE BRAKING FRICTION COEFFICIENT WITH μ SKID AND μ MAX – CONDITION L20.004.035.1

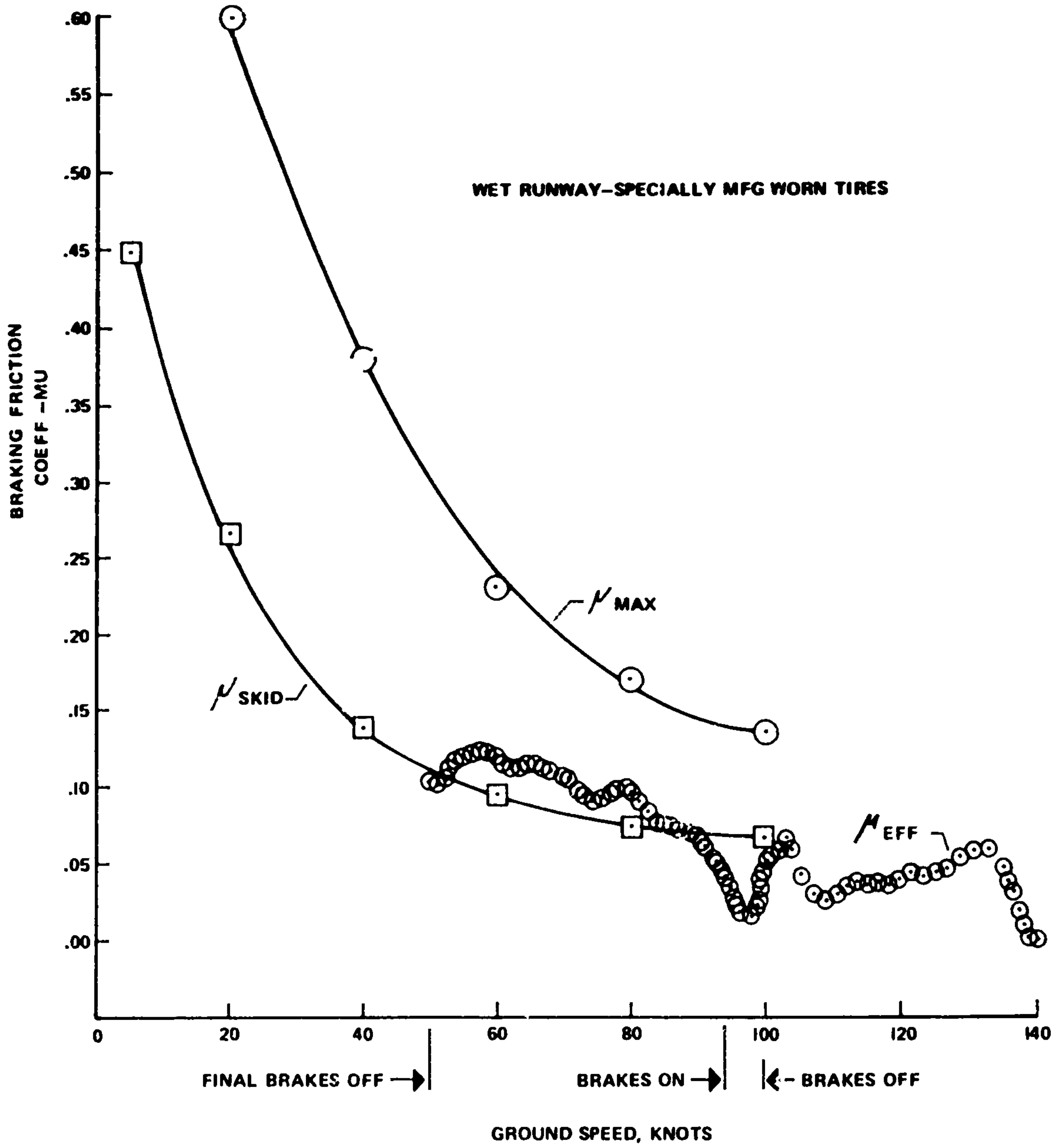
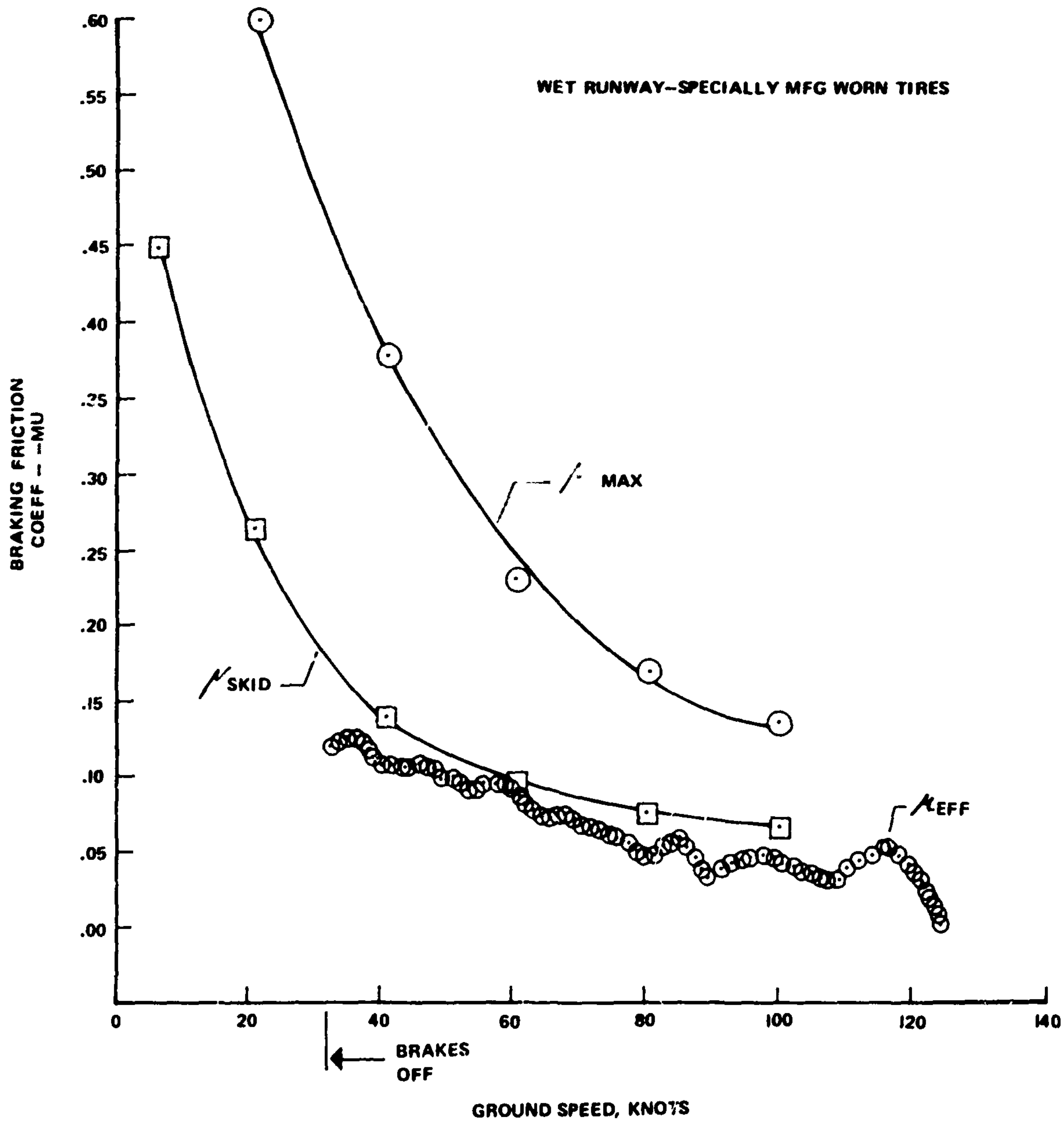
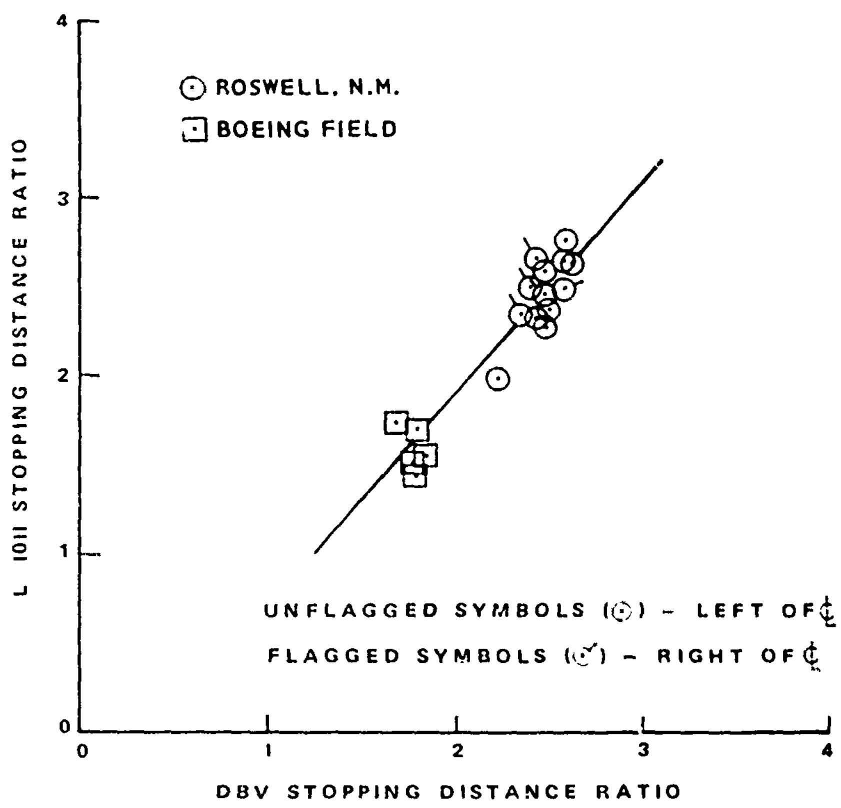


FIGURE 62
COMPARISON OF EFFECTIVE BRAKING FRICTION COEFFICIENT
WITH μ SKID AND μ MAX – CONDITION L20.004.036





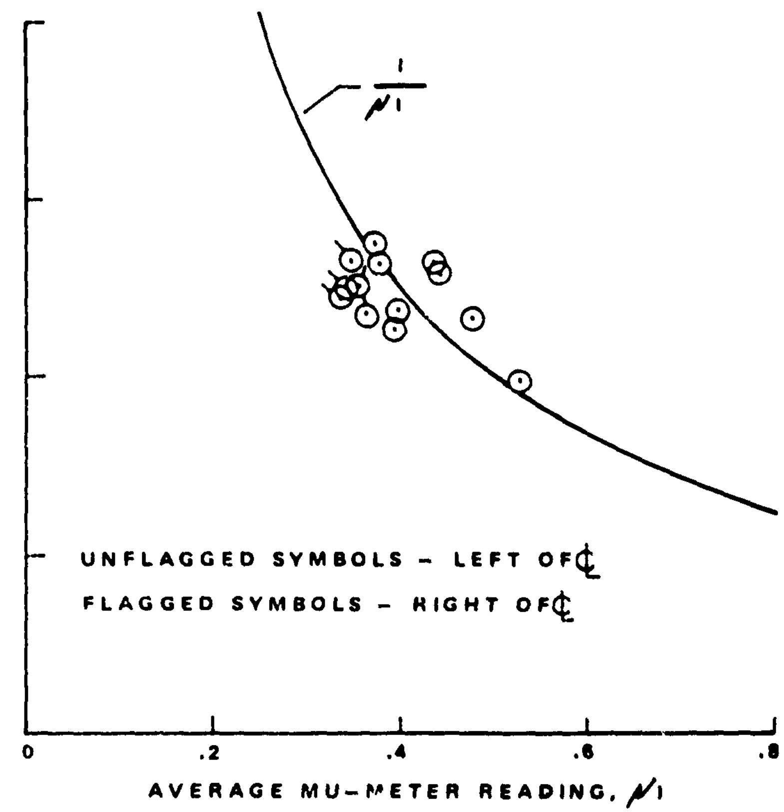


FIGURE 63 COMPARISON OF THE L-1011 WITH DIAGONAL-BRAKED VEHICLE STOPPING DISTANCE RATIOS AND MU-METER READINGS

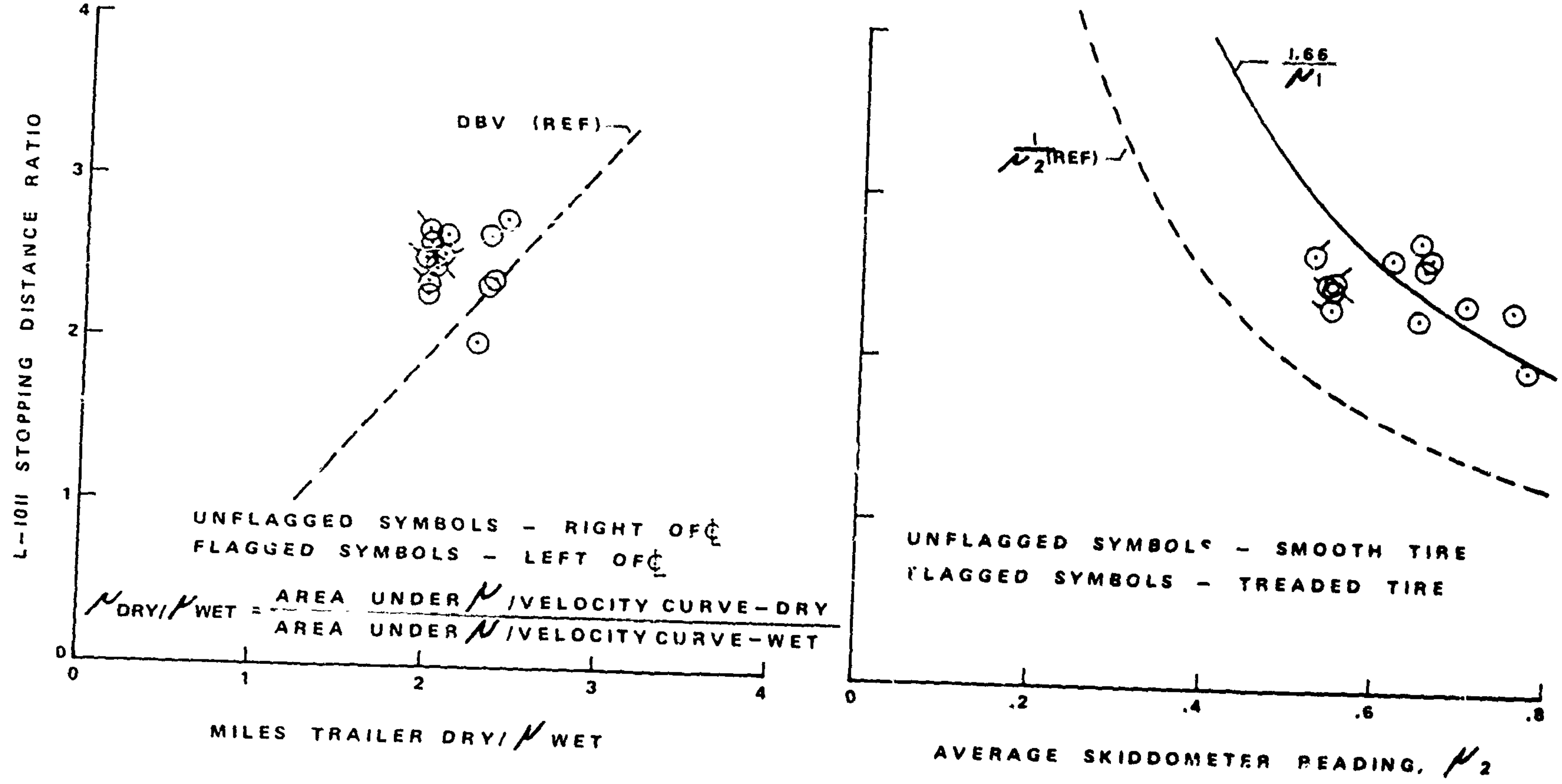


FIGURE 64 COMPARISON OF THE L-1011 WITH MILES TRAILER μ_{DRY}/μ_{WET} RATIOS AND SKIDDOMETER READINGS

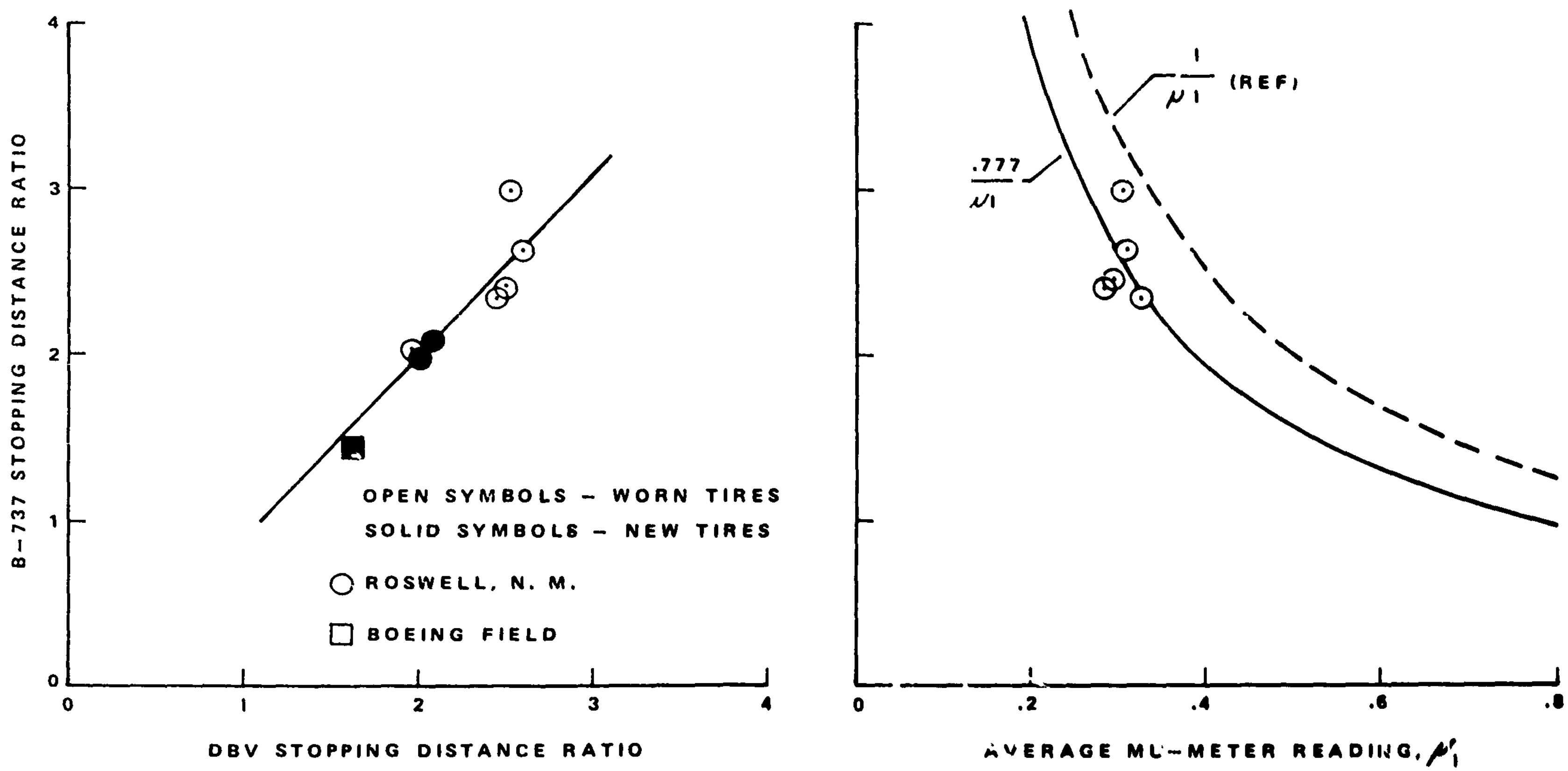


FIGURE 65 COMPARISON OF THE B-737 WITH DIAGONAL -BRAKED VEHICLE STOPPING DISTANCE RATIOS AND MU-METER READINGS

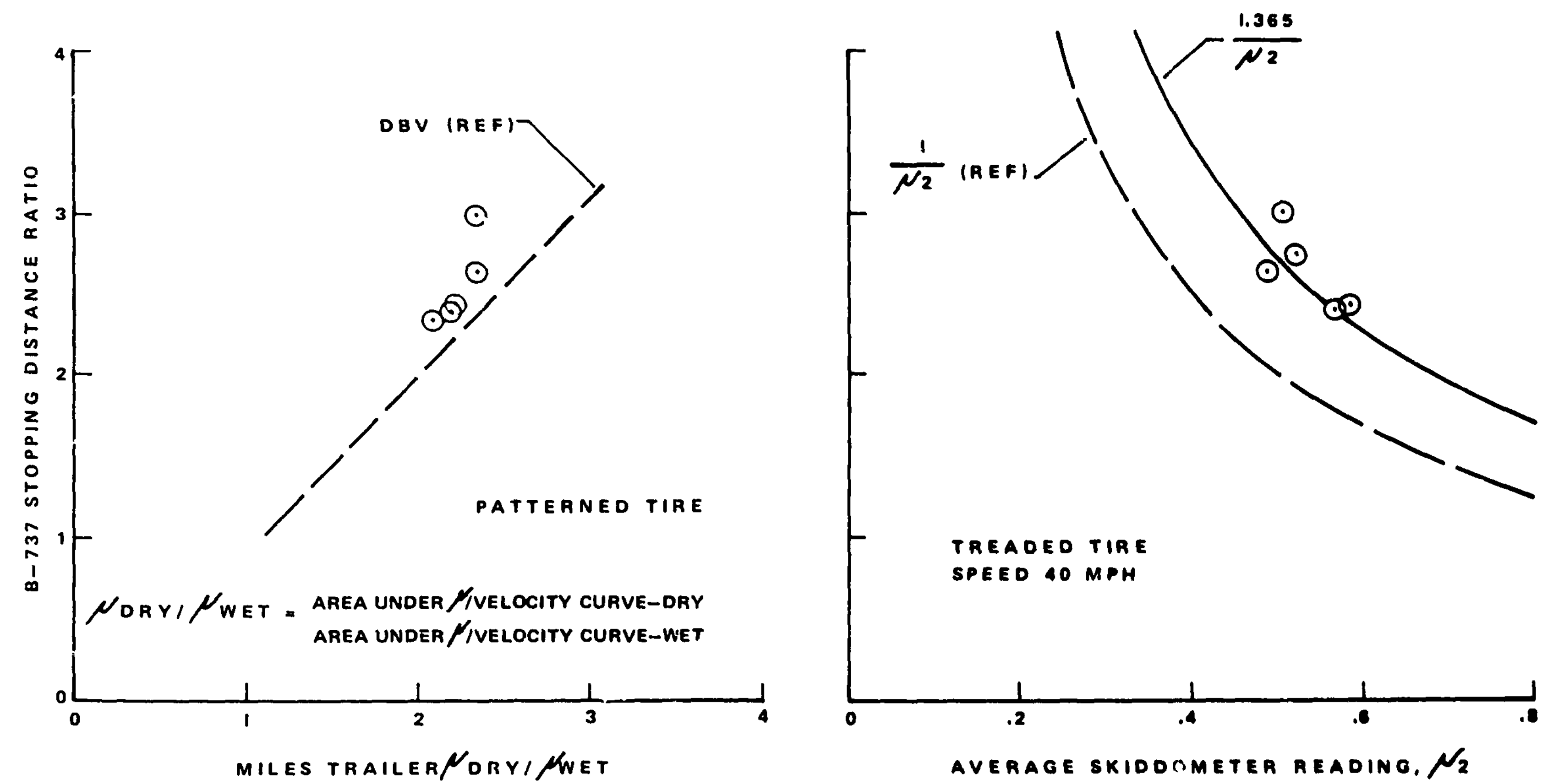


FIGURE 66 COMPARISON OF THE B–737 WITH MILES TRAILER μ_{DRY}/μ_{WET} RATIOS AND SKIDDOMETER READINGS

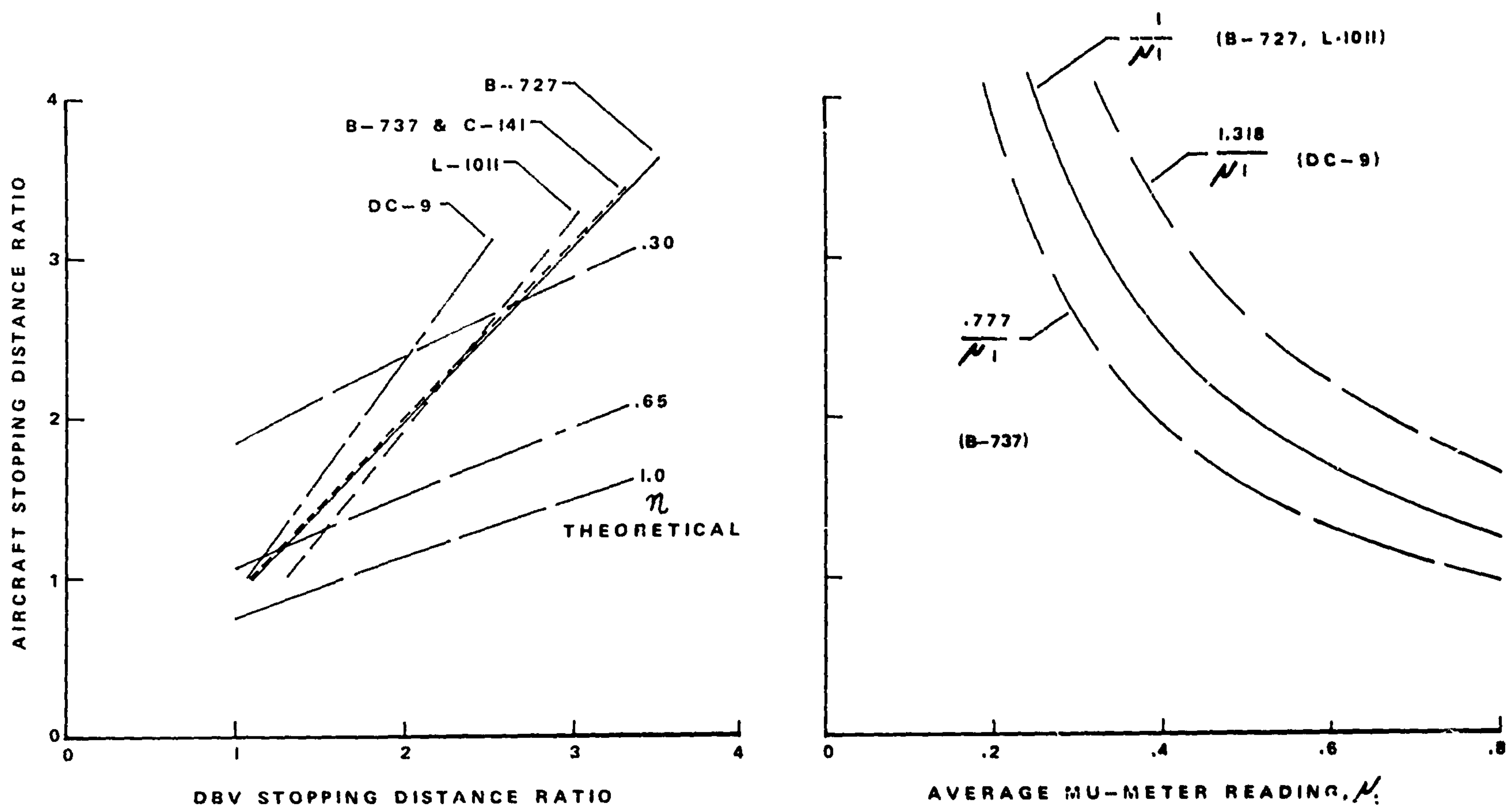


FIGURE 67 SUMMARY COMPARISON OF AIRCRAFT WITH DIAGONAL – BRAKED VEHICLE STOPPING DISTANCE RATIOS AND MU-METER READINGS

FIGURE 68

L–1011 – COMPARISON OF AFM LANDING PERFORMANCE WITH THAT OBTAINED USING CONCORDE SPECIAL CONDITION LANDING REQUIREMENT AT ROSWELL, N. M. ELEV 3669 FT

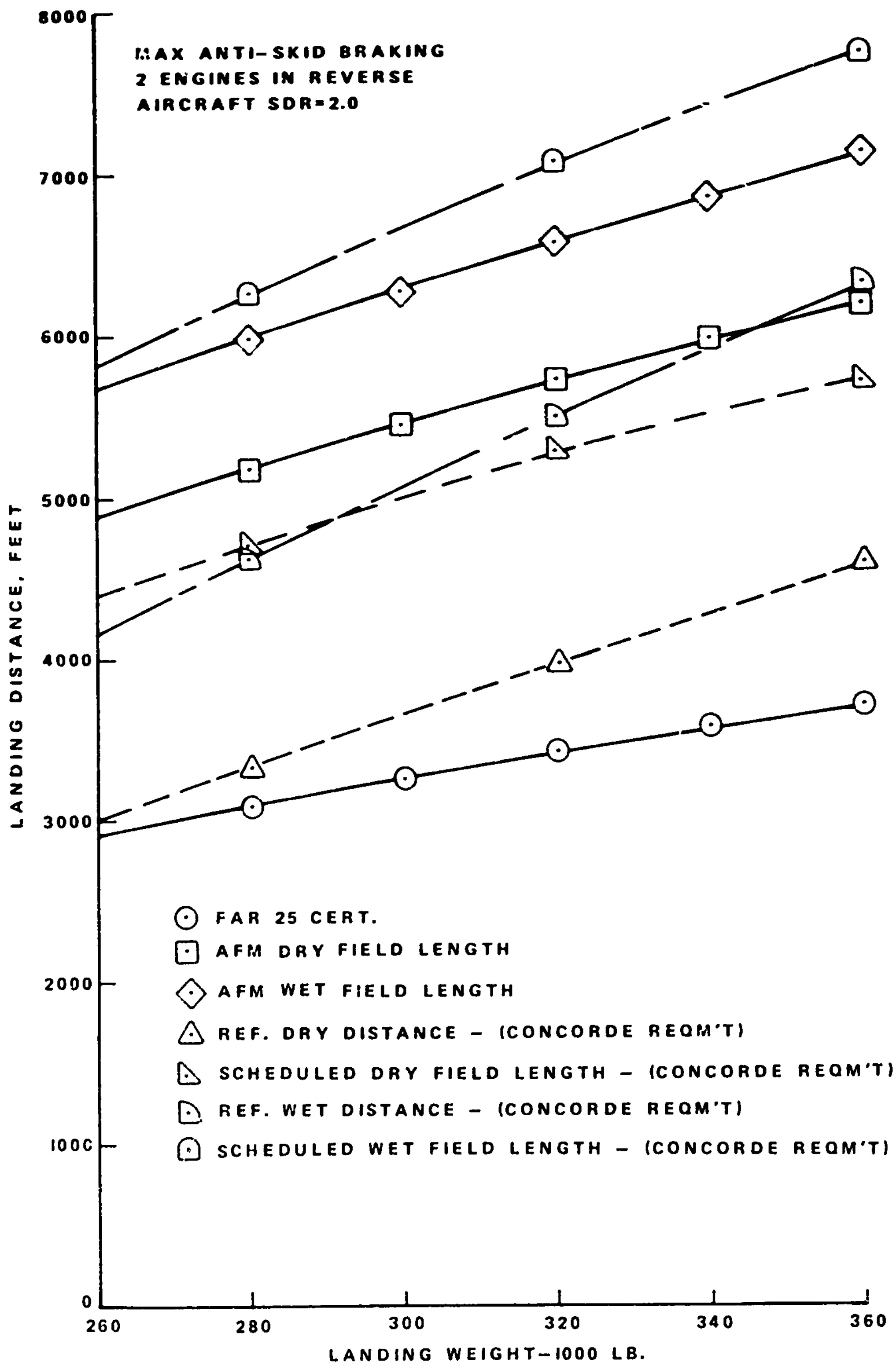


FIGURE 69

B-737 COMPARISON OF AFM LANDING PERFORMANCE WITH THAT OBTAINED USING THE CONCORDE SPECIAL CONDITION LANDING REQUIREMENT AT ROSWELL, N. M. ELEVATION 3669 FEET

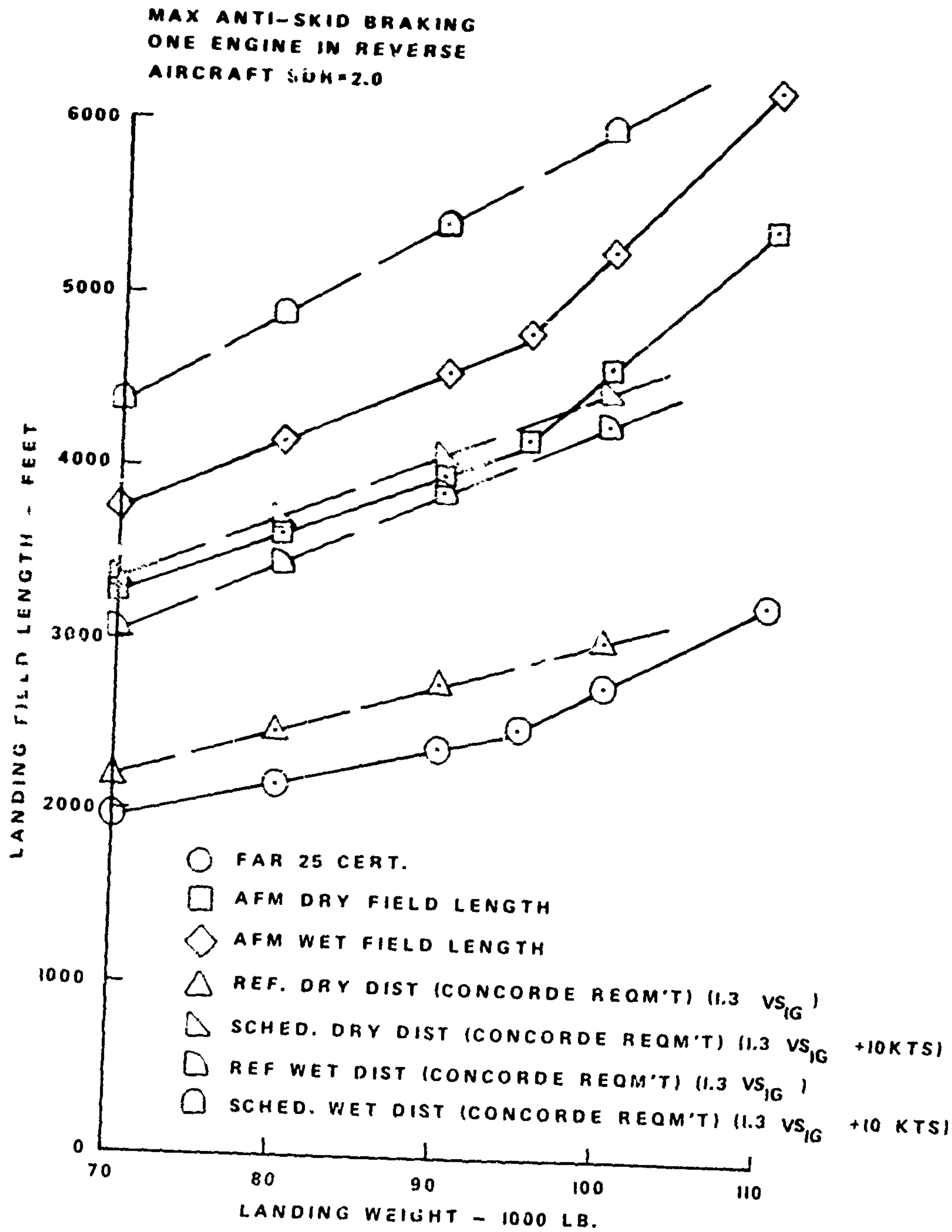


FIGURE 70

B-737 ADV

CERTIFICATION STALL SPEEDS

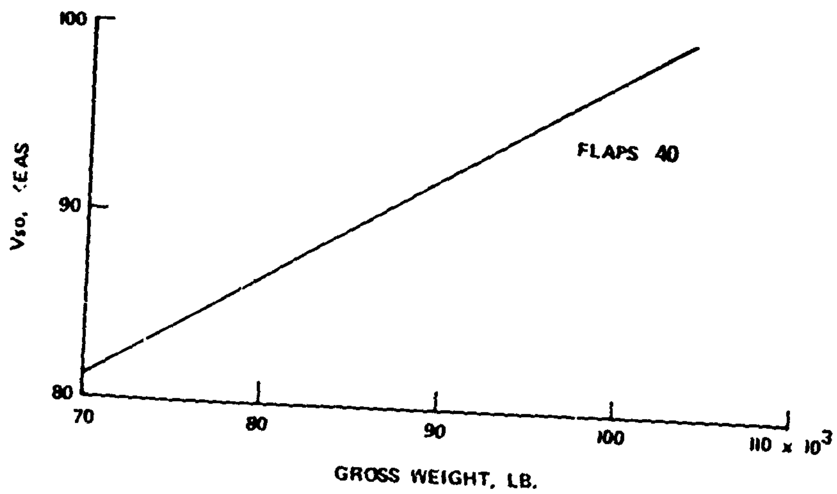


FIGURE 71
B-737 COMPARISON OF AFM LANDING PERFORMANCE (USING μB OBTAINED AT ROSWELL, N. M.) WITH THAT OBTAINED USING CONCORDE SPECIAL CONDITION LANDING REQUIREMENT AT ROSWELL, N. M. ELEV. 3669 FEET

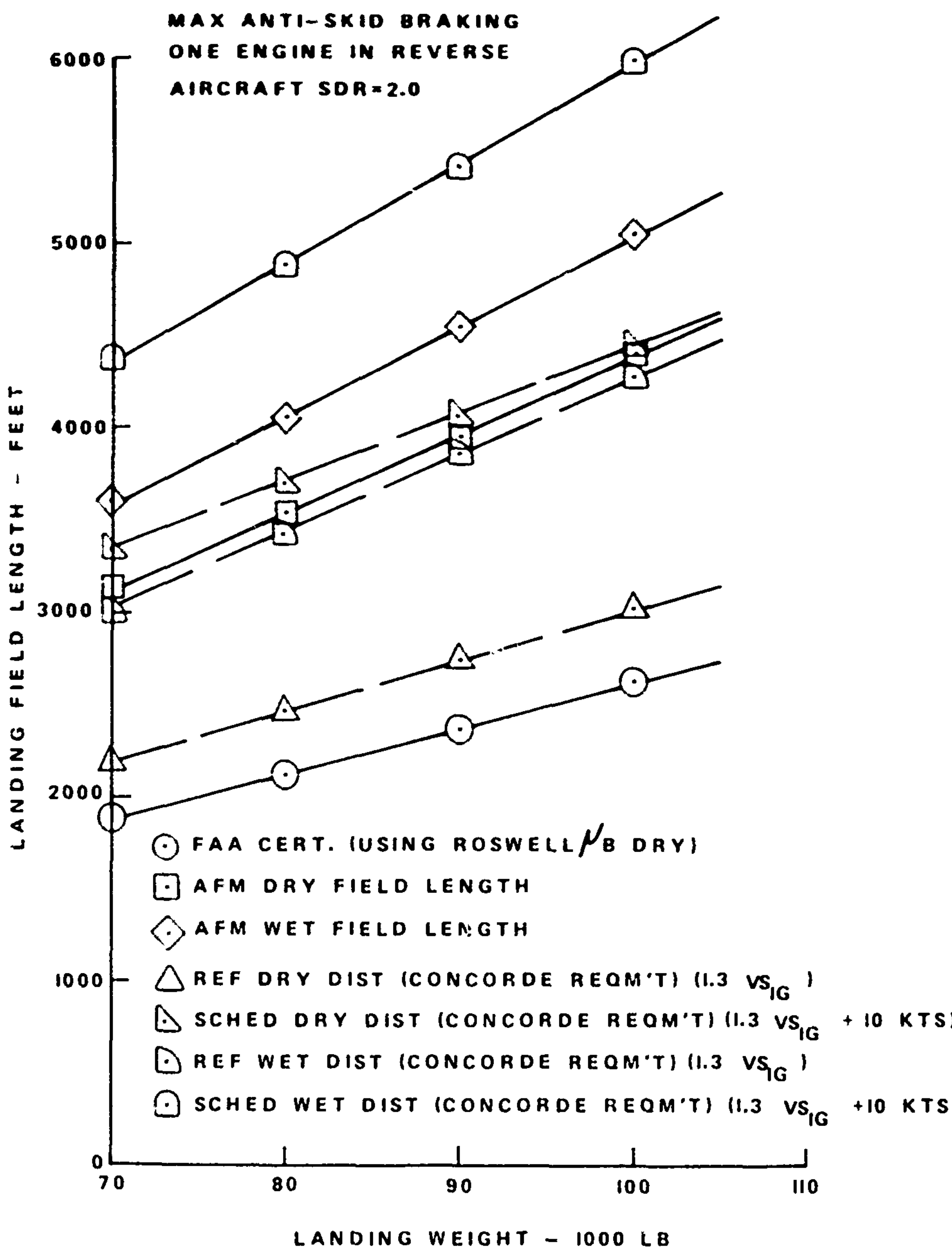


FIGURE 72
RELATIONSHIPS OF DBV AND AIRCRAFT SDR'S
TO AIRCRAFT μ_B DRY / μ_B WET RATIO – L-1011

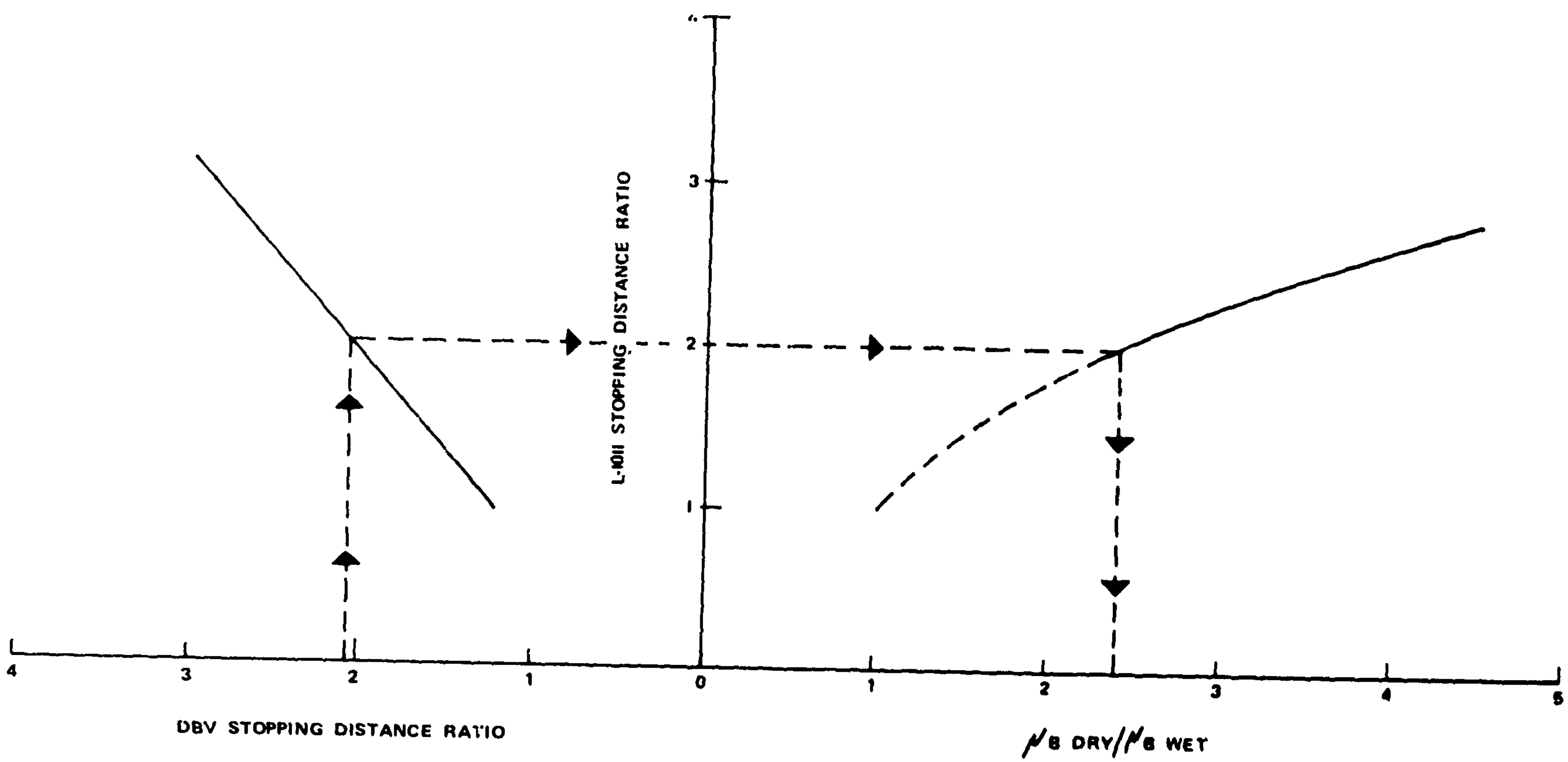


FIGURE 73
RELATIONSHIPS OF DBV AND AIRCRAFT SDR'S
TO AIRCRAFT μ_B DRY/ μ_B WET RATIO -- B-737

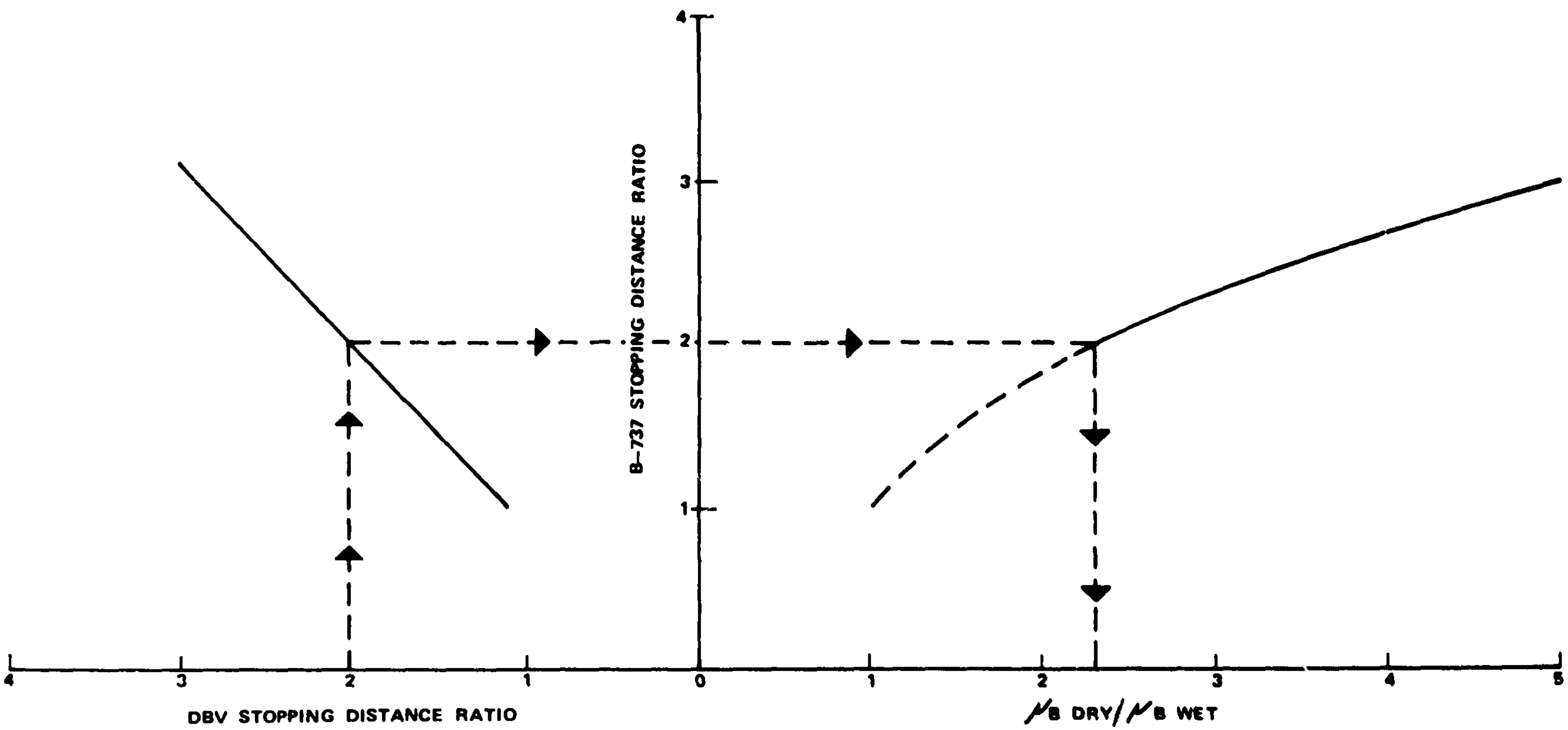


FIGURE 74
L-1011 COMPARISON OF AFM LANDING PERFORMANCE
WITH THAT OF CONCORDE SPECIAL CONDITION
LANDING REQUIREMENT USING MODIFIED ASSUMPTIONS
ROSWELL, N. M. ELEVATION 3669 FEET

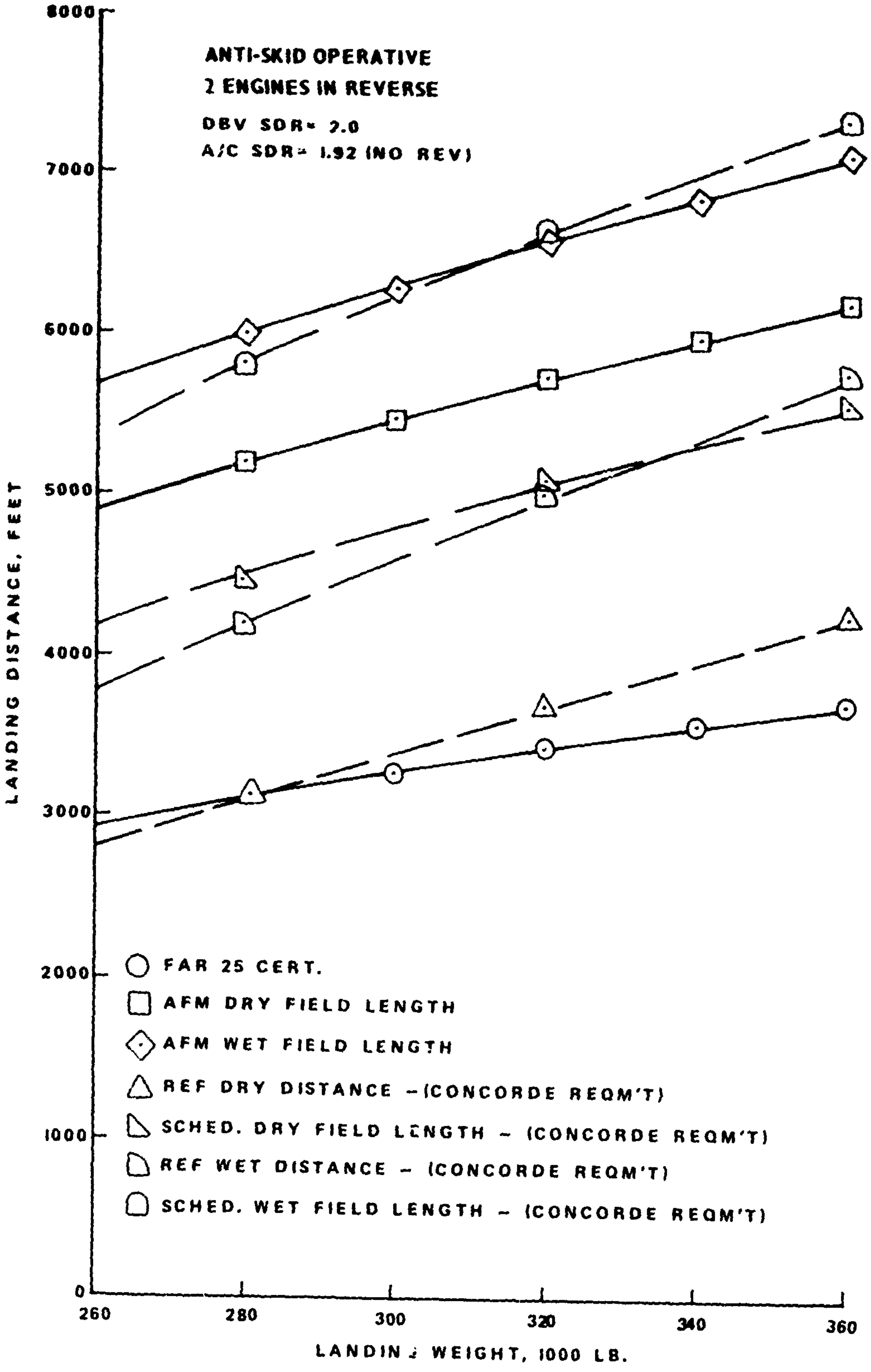
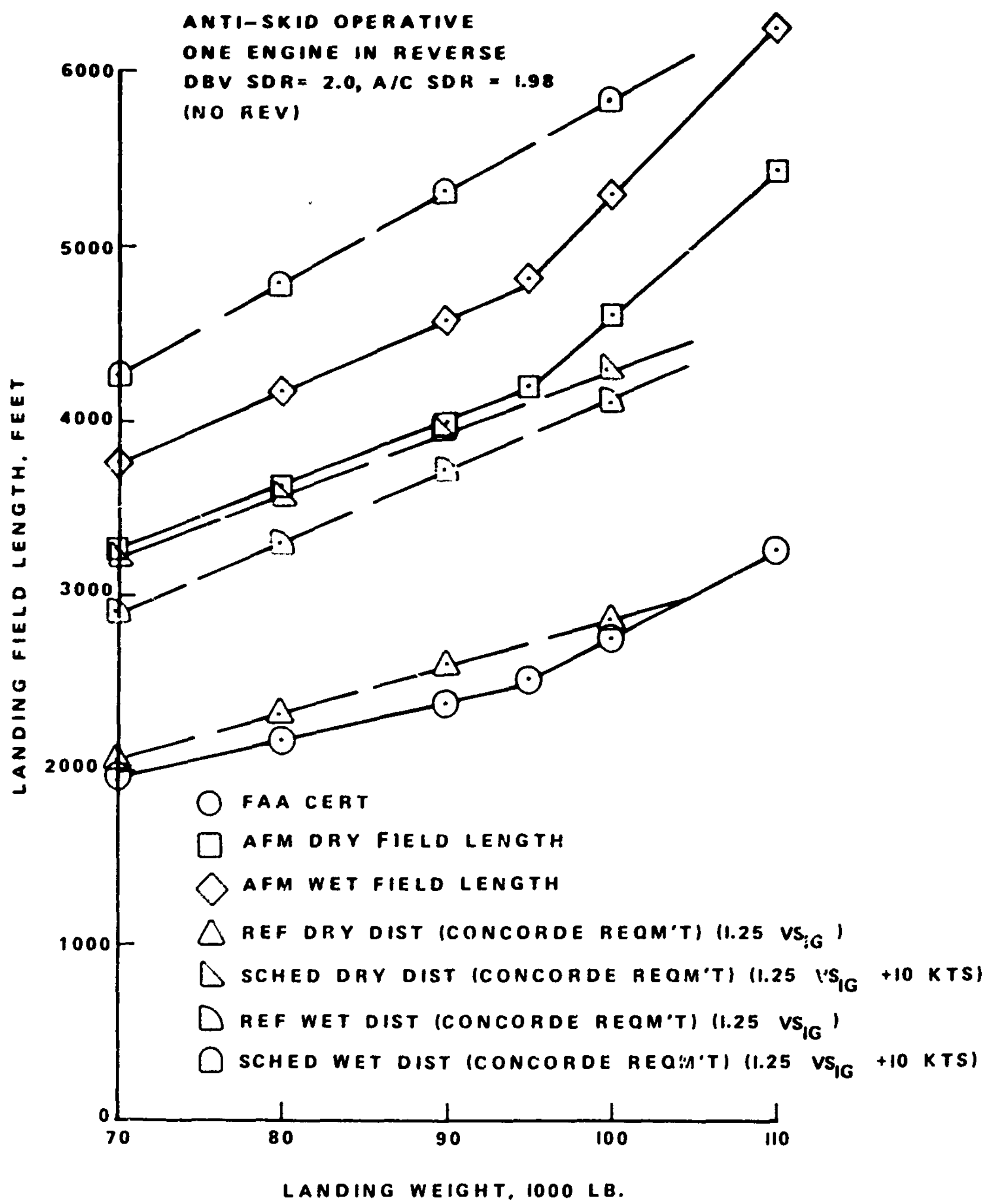


FIGURE 75

B-737 – COMPARISON OF AFM LANDING PERFORMANCE
WITH THAT OF CONCORDE SPECIAL CONDITION
LANDING REQUIREMENT USING MODIFIED ASSUMPTIONS
ROSWELL, N. M. ELEVATION 3669 FEET



MODEL CH-3 ?? · AIRCRAFT ????

TABLE I

TEST ITEM MEASUREMENT LIST (TML)

TEST ITEM NO. = 51.169 [illegible]

MEASUREMENT SOURCES [illegible] TOTAL 46 [illegible]

BATCH MEASUREMENTS [illegible]

MEAS. NO.	MEAS. TITLE	[illegible]	[illegible]	UNITS	[illegible]	ACC.	[illegible]	[illegible]	[illegible]
[illegible]	LONGITUDINAL ACCEL. C.G.	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	NORMAL ACCEL. C.G.	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	LATERAL ACCEL. C.G.	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE I (CONT'D.)

TEST ITEM MEASUREMENT LIST (TYPE)

MODEL L-1011
AIRCRAFT 1001

[illegible]

TEST ITEM NO. - 51.149 RAM LANDING-CONCORDE SP. CONC. 25-A7-FU-12 REQUESTER - [illegible] DATE [illegible]

MEASUREMENT SOURCES REQUIRED TOTAL 46 PCM [illegible] FM 1[illegible] TM [illegible] [illegible] [illegible] AD 2 OSC [illegible] CA [illegible] MISC [illegible]

[illegible] MEASUREMENTS SET

MEAS. NO.	MEAS. TITLE	REC. MEDIA	DIS. MEDIA	UNITS	REQ'D RANGE		ACC. PCT	[illegible]	[illegible]	ORIGIN
1.6001	RAM AIR TEMPERATURE-1 ST-1	P		DEG.C	-70	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1[illegible]	RAM AIR TEMPERATURE - S [illegible] SPARE BOLS 2	F		DEG.C	-70	[illegible]	0.[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] - RADIO ALTITUDE	P		FEET	0	2[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	ENGINE STATUS [illegible]	P							[illegible]	[illegible]
[illegible]	AIR PART [illegible]	P							[illegible]	[illegible]
[illegible]	AIR [illegible]	P							[illegible]	[illegible]
[illegible]	[illegible] EVENT MARK [illegible]	P							[illegible]	[illegible]
										[illegible]

RECORDING MEDIA

P - PULSE CODE MODULATION (PCM)

F - FREQUENCY MODULATION (FM)

DISPLAY MEDIA

A - AUTOMATIC [illegible] (LIMITS PANEL)

REVISION ACTION TAKEN - NONE

TABLE II

TEST ITEM MEASUREMENT REQUIREMENTS (TIMR)

[illegible]
[illegible]
[illegible]

[illegible] DATE [illegible]
ENTERED DATE [illegible] 1137
REVISED DATE [illegible] 1137

TEST ITEM [illegible] LIST OF INSTRUMENTATION FOR FAA [illegible] RUNWAY TEST
FAA
REQUESTED BY
GROUP

MEASUREMENTS REQUIRED FOR THIS TEST ITEM

MEAS NO.	SECT	MEASUREMENT DESCRIPTION	UNITS	RECORD MEDIA		MIN VALUE	MAX VALUE	ACC	FREQ RESP SAMPLES OR FREQ
[illegible]		TIME < IAS > AIRPLANES [illegible]	SEC	[illegible]	NEW	[illegible]	[illegible]	.012	[illegible]
[illegible]	A	[illegible] AIRPLANES [illegible]	[illegible]	[illegible]	[illegible]	-1	[illegible]	[illegible]	[illegible]
[illegible]	A	[illegible] LONGITUDINAL < AIRPLANE > AIRPLANE [illegible]	[illegible]	[illegible]	NEW	[illegible]	[illegible]	[illegible]	20 CPS
[illegible]	A	[illegible] LONGITUDINAL < AIRPLANE [illegible] > AIRPLANES [illegible]	[illegible]	[illegible]	NEW	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	A	[illegible] < AIRPLANE > AIRPLANE [illegible]	G	[illegible]	NEW	[illegible]	[illegible]	.1	[illegible]
[illegible]	A	POSITION, [illegible] < AIRPLANE PITCH, [illegible] > [illegible] GYRO AIRPLANES [illegible]	DEG	[illegible]	NEW	-25	25	[illegible]	[illegible]
[illegible]	A	POSITION, [illegible] < AIRPLANE ROLL > [illegible] GYRO AIRPLANES [illegible]	DEG	[illegible]	NEW	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	A	POSITION, [illegible] < PITCH > [illegible] TEST [illegible] AIRPLANES [illegible]	DEG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	A	[illegible] < [illegible] > RIGHT [illegible] AIRPLANES [illegible]	IN [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	A	[illegible], IMPACT < AIRSPEED > COPILOTS PT - PILOTS PT AIRPLANES [illegible]	IN HG	[illegible]	NEW	0	[illegible]	[illegible]	[illegible]
[illegible]	A	[illegible], IMPACT < AIRSPEED > PILOTS AIRPLANES [illegible]	KNOTS	[illegible]	NEW	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	A	[illegible], IMPACT < AIRSPEED > PILOTS AIRPLANES [illegible]	KNOTS	[illegible]	NEW	[illegible]	[illegible]	[illegible]	
[illegible]	A	[illegible], STATIC < ALTITUDE > COPILOTS PT AIRPLANES [illegible]	IN HG	[illegible]	[illegible]	6.5	[illegible]	[illegible]	[illegible]
01022	A	[illegible], STATIC < ALTITUDE > PILOTS AIRPLANES [illegible]	FEET	[illegible]	NEW	[illegible]	[illegible]	[illegible]	
[illegible]	A	RATE, [illegible] < [illegible] RADAR > [illegible] AIRPLANES [illegible]	FT/SEC	[illegible]	NEW	0	15		
[illegible]	A	TEMPERATURE, TOTAL < AIR > FLIGHT TEST [illegible] AIRPLANES [illegible]	[illegible] C	[illegible]	NEW	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	A	VELOCITY, EAST-WEST < INS > AIRPLANES [illegible]	KNOTS	[illegible]	NEW	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	A	VELOCITY, NORTH-SOUTH < INS > AIRPLANES [illegible]	KNOTS	[illegible]	NEW	0	[illegible]	[illegible]	[illegible]
[illegible]	E	ELECTRICAL, VOLTAGE < ANTISKID VALVE > LEFT INBOARD WHEEL AIRPLANES [illegible]	VOLTS	15	NEW	0	[illegible]	[illegible]	[illegible] CPS
[illegible]	E	ELECTRICAL, VOLTAGE < ANTISKID VALVE > LEFT OUTBOARD WHEEL AIRPLANES [illegible]	VOLTS	15	NEW	[illegible]	[illegible]	[illegible]	[illegible] CPS
[illegible]	E	ELECTRICAL, VOLTAGE < ANTISKID VALVE > RIGHT INBOARD WHEEL AIRPLANES [illegible]	VOLTS	15	NEW	0	[illegible]	.50	[illegible] CPS
09407	E	ELECTRICAL, VOLTAGE < ANTISKID VALVE > RIGHT OUTBOARD WHEEL AIRPLANES [illegible]	VOLTS	15	NEW	0	10	[illegible]	100 CPS

TABLE II (CONT'D)

TEST ITEM MEASUREMENT REQUIREMENTS (TIME)

AIRPLANE MODEL [illegible]
AIRPLANE NUMBER [illegible]
FTIR NUMBER 001

PRINTED DATE 09/06/73
ENTERED DATE 09/06/73 1137
REVISED DATE 09/06/73 1137

TEST ITEM X.XX.XXX LIST OF INSTRUMENTATION FOR RPR WET RUNWAY TEST
EWA REQUESTED BY GROUP

MEASUREMENTS REQUIRED FOR THIS TEST ITEM

MEAS NO	SECT	MEASUREMENT DESCRIPTION	UNITS	RECORD MEDIA		MIN VALUE	MAX VALUE	ACC	TIME BET.GEN SAMPLES OR FREQ
[illegible]	F	POSITION, VERTICAL < [illegible] > LEFT MAIN GEAR AIRPLANES [illegible]-001	INCHES	OS	NEW	0	15	.65	[illegible] CPS
[illegible]	F	POSITION, VERTICAL < [illegible] > RIGHT MAIN GEAR AIRPLANES [illegible]-001	INCHES	OS	NEW	0	15	.65	[illegible] CPS
[illegible]	F	PRESSURE < BRAKE (METERED) > LEFT INBOARD AIRPLANES [illegible]	PSI	OS	NEW	0	3000	150	100 CPS
[illegible]	F	PRESSURE < BRAKE (METERED) > LEFT OUTBOARD AIRPLANES [illegible]	PSI	OS	NEW	0	3000	150	100 CPS
03627	F	PRESSURE < BRAKE (METERED) > RIGHT OUTBOARD AIRPLANES [illegible]-001	PSI	OS	NEW	0	3000	150	100 CPS
03631	F	PRESSURE < BRAKE > LEFT INBOARD AIRPLANES [illegible]-001	PSI	OS	NEW	0	3000	150	250 CPS
[illegible]	F	PRESSURE < BRAKE > LEFT OUTBOARD AIRPLANES [illegible]-001	PSI	OS	NEW	0	3000	150	250 CPS
[illegible]	F	PRESSURE < BRAKE > RIGHT INBOARD AIRPLANES [illegible]	PSI	OS	NEW	0	3000	150	250 CPS
[illegible]	F	PRESSURE < BRAKE > RIGHT OUTBOARD AIRPLANES [illegible]	PSI	OS	NEW	0	3000	150	250 CPS
[illegible]	F	RATE, [illegible] < WHEEL > LEFT INBOARD AIRPLANES [illegible]	VDC	OS	NEW	4	16	.75	100 CPS
[illegible]	F	RATE, [illegible] < WHEEL > LEFT OUTBOARD AIRPLANES [illegible]	VDC	OS	NEW	4	16	.75	100 CPS
[illegible]	F	RATE, [illegible] < WHEEL > RIGHT INBOARD AIRPLANES [illegible]	VDC	OS	NEW	4	16	.75	100 CPS
[illegible]	F	RATE, [illegible] < WHEEL > RIGHT OUTBOARD AIRPLANES [illegible]	VDC	OS	NEW	4	16	.75	100 CPS
[illegible]	F	TEMPERATURE < BRAKE, NO. 1 STATOR > LEFT INBOARD AIRPLANES [illegible]	DEG F	WF	NEW	0	2000	100	
[illegible]	F	TEMPERATURE < BRAKE, NO. 1 STATOR > LEFT OUTBOARD AIRPLANES [illegible]-001	DEG F	WF	NEW	0	2000	100	
[illegible]	F	TEMPERATURE < BRAKE, NO. 1 STATOR > RIGHT INBOARD AIRPLANES [illegible]-001	DEG F	WF	NEW	0	2000	100	
[illegible]	F	TEMPERATURE < BRAKE, NO. 1 STATOR > RIGHT OUTBOARD AIRPLANES [illegible]-001	DEG F	WF	NEW	0	2000	100	
02009	I	POSITION < FLAP > HANDLE DETENT AIRPLANES [illegible]-001	DEG	PC	NEW	0	40	1	.4 SEC
[illegible]	I	POSITION < SPOILER CONTROL HANDLE > PILOTS CONSOLE AIRPLANES [illegible]-001		OS	NEW	DOWN	UP		5 CPS
[illegible]	K	POSITION < BOOST PUMP NO. 1 SWITCH > FUEL SYSTEM, CENTER WING AIRPLANES [illegible]-001		PC	NEW	OFF	ON		.4 SEC
[illegible]	K	POSITION < BOOST PUMP NO. 1 SWITCH > FUEL SYSTEM, TANK NO. 1 AIRPLANES [illegible]-001		PC	NEW	OFF	ON		.4 SEC

TABLE II (CONT'D)

TEST ITEM MEASUREMENT REQUIREMENTS (TIMR)

AIRPLANE MODEL [illegible]-737 PRINTED DATE 09/[illegible]/7[illegible]
AIRPLANE NUMBER [illegible] ENTERED DATE 09/06/7[illegible] 1107
TEST NUMBER 101 REVISED DATE 09/06/7[illegible] 1107

TEST ITEM X.XX.XXX LIST OF INSTRUMENTATION FOR [illegible] WET RUNWAY TEST
[illegible] REQUESTED BY GROUP

MEASUREMENTS REQUIRED FOR THIS TEST ITEM

MEAS NO.	SECT	MEASUREMENT DESCRIPTION	UNITS	RECORD MEDIA		MIN VALUE	MAX VALUE	ACC	TIME BETWEEN SAMPLES OR FREQ
03[illegible]	K	POSITION < BOOST PUMP NO. 1 SWITCH > FUEL SYSTEM, TANK NO. [illegible] AIRPLANES [illegible]		PC	NEW	OFF	ON		.6 SEC
[illegible]	K	POSITION < BOOST PUMP NO. [illegible] SWITCH > FUEL SYSTEM, [illegible] AIRPLANES [illegible]100-001		PC	NEW	OFF	ON		.6 SEC
03[illegible]	K	POSITION < BOOST PUMP NO. [illegible] SWITCH > FUEL SYSTEM, TANK NO. 1 AIRPLANES [illegible]		PC	NEW	OFF	ON		.6 SEC
036[illegible]	K	POSITION < BOOST PUMP NO. [illegible] SWITCH > FUEL SYSTEM, TANK NO. 2 AIRPLANES [illegible]		PC	NEW	OFF	ON		.6 SEC
[illegible]	K	QUANTITY < ELAPSED FUEL > ENGINE NO. 1 AIRPLANES P[illegible]-001	GAL	PC	NEW	0	[illegible]	.01	.6 SEC
[illegible]	K	QUANTITY < ELAPSED FUEL > ENGINE NO. 2 AIRPLANES [illegible]	GAL	PC	NEW	0	[illegible]	.01	.6 SEC
[illegible]	K	QUANTITY, TOTALIZER < APU > FUEL IN AIRPLANES [illegible]	GAL	PC	NEW	0	10[illegible]	.1	.6 SEC
[illegible]	K	QUANTITY, TOTALIZER < ENGINE NO. 1 > FUEL IN AIRPLANES [illegible]-001	GAL	PC	NEW	0	[illegible]	.1	.6 SEC
[illegible]	K	QUANTITY, TOTALIZER < ENGINE NO. 2 > FUEL IN AIRPLANES [illegible]	GAL	PC	NEW	0	[illegible]	.1	.6 SEC
0205[illegible]	K	TEMPERATURE, FUEL < APU > FUEL TOTALIZER IN AIRPLANES [illegible]	DEG C	PC	NEW	-[illegible]	40	1	.6 SEC
[illegible]	K	TEMPERATURE, FUEL < ENGINE NO. 1 > FUEL TOTALIZER IN AIRPLANES [illegible]-001	DEG C	PC	NEW	-[illegible]	40	1	.6 SEC
[illegible]	K	TEMPERATURE, FUEL < ENGINE NO. 2 > FUEL TOTALIZER IN AIRPLANES [illegible]	DEG C	PC	NEW	-[illegible]	40	1	.6 SEC
03[illegible]	M	LOAD < [illegible] STRUT > LEFT MAIN LANDING GEAR AIRPLANES P[illegible]-001	KIPS	TS	NEW	-[illegible]	1[illegible]	[illegible]	[illegible] SPS
[illegible]	M	LOAD < [illegible] STRUT > RIGHT MAIN LANDING GEAR AIRPLANES [illegible]	KIPS	TS	NEW	-[illegible]	1[illegible]	[illegible]	[illegible] SPS
[illegible]	M	LOAD < TORQUE LINK > MAIN LANDING GEAR, LEFT AIRPLANES [illegible]-001	KIPS	TS	NEW	-[illegible]	40	1	[illegible] SPS
[illegible]	M	LOAD < TORQUE LINK > MAIN LANDING GEAR, RIGHT AIRPLANES [illegible]	KIPS	TS	NEW	-40	40	1	[illegible] SPS
[illegible]	M	POSITION < LANDING GEAR > AIRPLANES P[illegible]-001		PC	NEW	NOT [illegible]	[illegible]		.6 SEC
03[illegible]	M	POSITION, VERTICAL < [illegible] > NOSE GEAR AIRPLANES [illegible]	INCHES	FM	NEW	0	12	.6	
01[illegible]	O	POSITION < ENGINE NO. 1 THROTTLE > PILOTS CONSOLE AIRPLANES [illegible]-001	DEG	TS	NEW	0	[illegible]	[illegible]	[illegible] SPS
01[illegible]	O	POSITION < ENGINE NO. 2 THROTTLE > PILOTS CONSOLE AIRPLANES [illegible]-001	DEG	TS	NEW	0	[illegible]	[illegible]	[illegible] SPS
02148	O	POSITION < SURGE BLEED VALVE > ENGINE NO. 1 AIRPLANES PS199-001		PC	NEW	CLOSED	OPEN		.6 SEC

TABLE II (CONT'D)

[illegible] ITEM MEASUREMENT [illegible]

[illegible] PRINTED DATE [illegible]
AIRPLANE NUMBER [illegible] ENTERED DATE 02/06/73 1107
[illegible] REVISED DATE 02/06/73 1107

TEST ITEM [illegible] INSTRUMENTATION FOR [illegible] WET RUNWAY TEST
[illegible] REQUESTED BY GROUP

MEASUREMENTS [illegible] THIS TEST ITEM

MEAS NO	SECT	MEASUREMENT DESCRIPTION	UNITS	RECORD MEDIA		MIN VALUE	MAX VALUE	ACC	TIME BETWEEN SAMPLES OR CODES
02150	3	[illegible] VALV > ENGINE NO. [illegible] AT [illegible]		PC	NEW	CLOSED	OPEN		.4 SEC
[illegible]	3	[illegible] TOTAL < FAN EXIT (PT2) > ENGINE NO. 1 AT [illegible]	IN HG	PC	NEW	5	[illegible]	.05	.4 [illegible]
[illegible]	3	[illegible] TOTAL < FAN EXIT (PT2) > ENGINE NO. 2 AT [illegible]	IN HG	PC	NEW	5	[illegible]	.05	.4 [illegible]
02132	3	[illegible] TOTAL < TURBINE EXIT (PT7) > ENGINE NO. 1 AT [illegible]	IN HG	PC	NEW	5	[illegible]	.05	.4 SEC
[illegible]	3	[illegible] TOTAL < TURBINE EXIT (PT7) > ENGINE NO. 2 AT [illegible]	IN HG	PC	[illegible]	5	[illegible]	.05	.4 [illegible]
[illegible]	3	RPM < [illegible] COMPRESSOR (N2) > ENGINE NO. 1 AT [illegible]	RPM	PC	NEW	0	[illegible]	[illegible]	.4 [illegible]
[illegible]	3	[illegible] COMPRESSOR (N2) > ENGINE NO. 2 AT [illegible]	RPM	PC	NEW	0	[illegible]	[illegible]	.4 [illegible]
[illegible]	3	[illegible] (N1) > ENGINE NO. 1 AT [illegible]	RPM	PC	NEW	0	[illegible]	[illegible]	.4 [illegible]
[illegible]	3	[illegible] (N1) > ENGINE NO. 2 AT [illegible]	RPM	PC	NEW	0	[illegible]	[illegible]	.4 [illegible]
[illegible]	3	[illegible] ENGINE NO. 1 > TURBINE EXIT AT [illegible]	DEG C	PC	NEW	0	[illegible]	[illegible]	.4 [illegible]
[illegible]	3	[illegible] ENGINE NO. 2 > TURBINE EXIT AT [illegible]	DEG C	PC	NEW	0	[illegible]	[illegible]	.4 [illegible]
[illegible]	5	[illegible] AIRPLANES [illegible]			[illegible]				
[illegible]	5	[illegible] FORWARD VIEW, [illegible] AT [illegible]		[illegible]	[illegible]				
[illegible]	5	[illegible] STATION > AIRPLANES [illegible]		[illegible]	[illegible]				
[illegible]	5	[illegible] < [illegible] VALV > FUEL SYSTEM AT PLANE [illegible]		[illegible]	NEW	[illegible]	[illegible]		.4 [illegible]
02052	5	[illegible] < CONDITION AND EVENT > AIRPLANES [illegible]		PC	[illegible]	[illegible]	[illegible]		.4 SEC

RECORD MEDIA CODE

PC - PULSE CODE TAPE
FM - FREQUENCY MODULATION TAPE
OS - OSCILLOGRAPH
PI - PILOTS PANEL
MN - MANUAL
WE - WEIGHTS ENGINEER
EQ - EQUIPMENT

MEASUREMENT DESCRIPTION FORMAT

TYPE OF MEASUREMENT < COMPONENT > LOCATION

TABLE III

NASA DIAGONAL-BRAKED VEHICLE (DBV) INSTRUMENTATION

NO.	VARIABLE	INSTRUMENT	VISUAL DISPLAY	RECORDER (6 CHANNEL)
1	Ground Speed	DC generator (5th wheel)		X
2	Brake Application Speed	Magentic actuated reed switch coupled with crystal controlled timer (5th wheel) and hold circuit	Digital (1 mph units)	
3	Stopping Distance (From Brake Application)		Digital (1 foot units)	
4	Brake Application Speed	DC generator (5th wheel) and hold circuit	Digital (0.1 mph units)	
5	Stopping Distance (From Brake Application)	Magentic pick-up (5th wheel) & hold circuit	Digital (1 foot units)	
6	Stopping Distance (From Brake Application)	Revolution counter (5th wheel) & hold circuit	Digital (1 Count/Rev.)	
7	Main Wheel Speed (Each Wheel)	DC generators		X
8	Longitudinal Acceleration (Approximately c.g.)	Accelerometer		X
9	Brake Application	Brake pedal micro-switch		X (EVENT CHANNEL)
10	Timer	Crystal oscillator		X

PRIORITY

TABLE IV
MODEL L-1011
ROSWELL TEST CONDITIONS

- DRY -

PRIORITY	COND. NO. 51.149 XXX	APPROACH SPEED	GLIDE SLOPE	NO. OF ENGINES	GROSS WEIGHT	THRUST REVERSERS	SEGMENT AIR	SEGMENT TRAN	SEGMENT BRK	REMARKS
1	.01	V_{REF}	2.5°	3	MAX. LDG	NO	X	X	X	o BASIC DRY o DIRECT μ_B COMPARISON WITH WET CONDITIONS
	.02				MED					
	.03				MED					
	.04				MIN					
2	.05	V_{REF} + 10	2.5°	3	MAX	NO	X	X	X	o EFFECT OF SPEED ON DRY RUNWAY o DIRECT μ_B COMPARISON WITH WET COND.
	.06				MED					
	.07				MED					
	.08				MIN					
7	.09 1	V_{REF}	4.5°	3	MAX	N.R.	X			EFFECT OF GLIDE SLOPE ON AIR DISTANCE (TOUCH AND GO)
	2				MED					
	3				MIN					
5	.10 1	V_{REF}	1.5°	3	MAX	N.R.	X	*		*NOSE DOWN THEN APPLY BRAKES BRIEFLY & GO.
	2				MED					
	3				MIN					
8	.11 1	V_{REF}	4.5°	3	MAX	N.R.	X			EFFECT OF GLIDE SLOPE AND SPEED ON AIR DISTANCE (TOUCH & GO)
	2				MED					
	3				MIN					
6	.12 1	V_{REF} + 10	1.5°	3	MAX	N.R.	X	*		*NOSE DOWN THEN APPLY BRAKES BRIEFLY & GO
	2				MED	YES (2)	X	X	X	FULL STOP, COMPARE W.38
	3				MIN	N.R.	X	*		

TABLE IV (Cont'd.)

	COND. NO. 51.149 XXX	APPROACH SPEED	GLIDE SLOPE	NO. OF ENGINES	GROSS WEIGHT	THRUST REVERSERS	SEGMENT AIR	SEGMENT TRAN	SEGMENT BRK	REMARKS
				-DRY-						
4	.13	VREF + 10	1.5°	3	MED	NO	X	X	X	BASIC ALL ENGINE DRY RUNWAY CHECK CASE
3	.14	VREF	2.5°	3	MAX	YES (2)	X	X	X	DEMONSTRATION OF THRUST REVERSER EFFECT ON DRY RUNWAY
11	.15	VREF	2.5°	3	MAX	N.R.	*			*1.5g PULL UP TO EVALUATE 0.5g INCREMENTAL MANEUVER CAPABILITY
10	.16 .1 .2	0.9VREF 0.95VREF-1	3.0°	3 2	MIN MIN	N.R.	*			*CONTROLLABILITY ONLY, NO LANDING PERF. DATA REQUIRED
9	.17 .1 .2	VREF	2.5°	3	MAX MIN	N.R.		X		DELAY BRAKES ON UNTIL NOSE WHEEL TOUCH DOWN TO EVALUATE PROCEDURE AND RESULTING TRANSITION SEGMENT. APPLY BRAKES BRIEFLY AND THEN GO AT PILOT'S OPTION.
				-WET-						
9	.18 .1 .2	VREF	2.5°	3	MAX MIN	N.R.		X		

TABLE IV (Cont'd.)

-WET -

	COND. NO. 51.149.XXX	APPROACH SPEED	GLIDE SLOPE	NO. OF ENGINES	GROSS WEIGHT	THRUST REVERSERS	SEGMENT AIR	SEGMENT TRAN	SEGMENT BRK	REMARKS
1	.19 .20 .21 .22	VREF	2.5°	3	MAX. LDG MED MED MIN	NO	X	X	X	o BASIC WET o DIRECT μ_B COMPARISON WITH DRY CONDITIONS
2	.23 .24 .25 .26	VREF + 10	2.5°	3	MAX MED MED MIN	NO	X	X	X	o EFFECT OF SPEED ON WET RUNWAY o DIRECT μ_B COMPARISON WITH DRY COND.
10	.27 .28	FLT. MANUAL VREF	2.5°	3	MED MED	NO	X	X	X	o EFFECT OF USING FAA FLT MANUAL VREF ON WET RUNWAY
11	.29	VREF	2.5°	3	MED	YES (3)	X	X	X	o EFFECT OF REVERSE
3	.30 .31 .32	VREF + 10	2.5°	3	MAX MED MIN	YES (2)	X	X	X	o EFFECT OF REVERSE o DIRECT COMPARISON WITH VREF + 10 WITHOUT REVERSE
8	.33 .34 .35	VREF + 10	2.5°	2	MAX MED MIN	YES (1)	X	X	X	o EFFECT OF REVERSE o DIRECT COMPARISON WITH PREVIOUS VREF + 10 TESTS
7	.36 .37	VREF + 10	1.5°	3	MED	YES (2) NO	X	X	X	BASIC ALL ENGINE LANDING W/WO THRUST REVERSERS ON WET RUNWAY

TABLE IV (Cont'd.)

WET

	COND. NO. 51.149.XXX	APPROACH SPEED	GLIDE SLOPE	NO. OF ENGINES	GROSS WEIGHT	THRUST REVERSERS	SEGMENT AIR	TRAN	BRK	REMARKS
6	.38	V_{REF} + 10	1.5°	3	MED	YES (2)	X	X	X	DELAY BRAKE APPLICATION UNTIL NOSE WHEEL TOUCHDOWN. BASIC LDG, ALL ABUSES INCLUDED.
5	.39	V_{REF}-1 + 5	1.5°	2	MED	YES (1)	X	X	X	BASIC ONE ENGINE INOPERATIVE LANDING WITH 1 THRUST REVERSER ON WET RUNWAY
12	.40	V_{REF}	2.5°	2	MED	YES (1)			*	*CROSS-WIND CONTROLLABILITY TO DETERMINE MAXIMUM ALLOWABLE ASYMMETRIC REVERSE THRUST ON A WET RUNWAY. (DELAY BRAKES TO 110 KTS.)
	.41	V_{REF}(AFM)	3°	3	MIN	NO	X	X	X	

NOTES:
1) FORWARD C.G. ALL TESTS.
2) ONE LANDING FLAP POSITION ALL TESTS.
3) DLC/AGSB OPERATIVE ALL TESTS.
4) ANTISKID OPERATIVE ALL TESTS.
5) WET RUNWAY SLIPPERINESS APPROXIMATELY THE SAME FOR ALL WET TESTS.
6) WET RUNWAY TIRES REPRESENT 80% WORN.
7) BRAKES ON AFTER MAIN GEAR TOUCHDOWN EXCEPT CONDITIONS .10, .12, .17, .18 & .38.

TABLE V

MODEL B-737
ROSWELL TEST CONDITIONS

Condition No.	G.W.	Flaps	App Speed	Glide Slope	No. of Engines On Approach	Reverse Thrust	Comments
1.20.004.001	Max	40	V_{REF}	2.5	2	Yes	Dry;
.002	Mid	40	V_{REF}	2.5	2	Yes	Reference landings.
.003	Min	40	V_{REF}	2.5	2	Yes	
.004	Max	40	V_{REF}	2.5	2	No	Dry;
.005	Mid	40	V_{REF}	2.5	2	No	Reverse thrust
.006	Min	40	V_{REF}	2.5	2	No	effect
.007	Max	15	V_{REF}-1	2.5	1	Yes (1)	Dry;
.008	Mid	15	V_{REF}-1	2.5	1	Yes (1)	Engine out effect.
.009	Min	15	V_{REF}-1	2.5	1	Yes (1)	
.010	Max	40	V_{REF}	2.5	2	Yes	Wet;
.011	Mid	40	V_{REF}	2.5	2	Yes	Reference landings.
.012	Min	40	V_{REF}	2.5	2	Yes	
.013	Max	40	V_{REF}	2.5	2	No	Wet;
.014	Mid	40	V_{REF}	2.5	2	No	Reverse thrust
.015	Min	40	V_{REF}	2.5	2	No	effect.
.016	Max	15	V_{REF}-1	2.5	1	Yes (1)	Wet;
.017	Mid	15	V_{REF}-1	2.5	1	Yes (1)	Engine out effect.
.018	Min	15	V_{REF}-1	2.5	1	Yes (1)	
.019	Max	40	V_{REF}	2.5	2	No	Wet;
.020	Min	40	V_{REF}	2.5	2	No	Delay braking until nose wheel touch-down.
.021	Max	40	V_{REF}	2.5	2	No	Dry;
.022	Min	40	V_{REF}	2.5	2	No	Delay braking until nose wheel touch-down.
.023	Mid	40	V_{REF}+10	1.5	2	Yes	Wet; Effect of
.024	Mid	40	V_{REF}+10	1.5	2	Yes	Dry; overspeed and glide slope

TABLE V (cont'd)

Condition No.	G.W.	Flaps	App Speed	Glide Slope	No. of Engines On Approach	Reverse Thrust	Comments
.025	Mid	15	V_{REF}-1+5	1.5	1	Yes	set; Effect of
.026	Mid	15	V_{REF}-1+5	1.5	1	Yes	Dr ; overspeed and glide slope
.027	Min	40	V_{REF}	2.5	2	Yes	X-wind. Not Conducted
.028	Min	[illegible]	V_{REF}-1	2.5	1	Yes	X-wind. Not Conducted
.030	Max	40	V_{REF}	2.5	2	No	Specially manufactured tires.
.031	Mid	40	V_{REF}	2.5	2	No	
.033	Mid	40	V_{REF}	2.5	2	No	
.035	Max	40	V_{REF}+10	2.5	2	No	
.035.1	Mid	40	V_{REF}	2.5	2	No	
.036	Mid	40	V_{REF}	2.5	2	No	

V_{REF}-1 - One Engine Inoperative Approach Speed

Table VI
DBV and Mu-Meter Results
from October 15, 1973 Tests on Runway 03,
Roswell, N.M.

See Page 6

TABLE VII
GROUND VEHICLE CORRELATION TEST - ROSWELL, N.M.
RUNWAY 03 OCTOBER 22, 1973

TEST SECTION	WATER DEPTH AV. IN.	USAF MU-METER µ AVg 40	BV-11-2 SKIDDO. µ AVg 40	NASA DBV SDR	NASA DBV 1/SDR	USAF DBV SDR	USAF DBV 1/SDR	MILES TRAILER µ @ 50 kts.
A-B	.014	.40	-	2.16	.463	-	-	-
	.01	.42	.53	2.08	.481	-	-	.240
	.01	.42	.56	2.25	.444	-	-	.240
	.01	.44	.55	1.87	.535	-	-	.345
	.008	.46	.53	1.85	.540	-	-	.305
	.008	.48	.60	1.77	.565	-	-	.300
	.030	.32	.45	2.42	.413	2.23	.448	.205
	.030	.35	.43	2.19	.457	2.20	.454	.230
	.025	.38	.48	2.18	.459	2.20	.454	.230
	.025	.40	.51	1.90	.526	2.01	.497	.280
	.015	.44	.55	2.01	.497	1.86	.538	.280
	.010	.47	.55	1.72	.581	1.69	.592	.330
C-D	.015	.31	.47	2.38	.420	-	-	.230
	.011	.39	.53	2.26	.442	-	-	.275
	.010	.41	.54	2.08	.481	2.01	.497	.290
	.005	.42	.57	2.08	.481	1.93	.518	.310
	.005	.48	.58	1.81	.552	1.94	.515	.330
	.005	.51	.62	1.69	.592	1.61	.621	.455
E-F	.025	-	-	2.57	.389	2.57	.389	-
	.020	-	-	2.19	.457	2.32	.431	.24
	.020	.39	.50	2.17	.461	2.31	.433	-
	.010	.49	.57	1.85	.540	2.01	.497	.25
	DAMP	.56	.58	1.77	.565	1.87	.535	.37
X-X	.043	-	-	2.96	.338	3.07	.326	.20
	.020	.32	.41	2.61	.383	2.56	.390	.23
	.005	-	-	2.49	.402	2.37	.422	.25

TABLE VIII

L-1011 LANDING PERFORMANCE SUMMARY
FLAPS 42° DLC/ACSB OPERATIVE, ANTI-SKID OPERATIVE
ROSWELL, N.M. RUNWAY 03 ELEVATION 3669 FT.

CONDITION NUMBER	RUNWAY SURFACE CONDITION	TARGET APP. SPEED	ACTUAL APP. SPEED (KTAS)	TARGET γ (DEG)	ACTUAL γ (DEG)	THRUST REVERSER
.601.01	DRY	V_{REF}	163.2	2.5	2.33	NO
.602.02		V_{REF}	157.9		3.36	
.603.07		V_{REF} +10	167.8		2.16	
.604.03		V_{REF}	152.4		2.87	
.605.08		V_{REF} +10	164.6		2.63	
.606.04		V_{REF}	149.5		2.49	
.607.10.3		V_{REF}	149.9	1.5	1.97	
.608.05		V_{REF} +10	170.0	2.5	2.97	
.611.19	WET	V_{REF}	158.9		2.68	
.612.20		V_{REF}	156.5		2.31	
.613.36		V_{REF} +10	168.9	1.5	1.86	YES (2)
.614.21		V_{REF}	156.1	2.5	2.61	NO
.615.22		V_{REF}	152.9		2.97	
.616.26		V_{REF} +10	159.6		2.85	
.617.18.2		V_{REF}	145.6		2.97	
.617.12.3		V_{REF} +10	163.4	1.5	1.64	
.618.37		V_{REF} +10	166.7	1.5	1.62	
.619.24			164.8	2.5	2.18	
.620.31			159.7		2.84	YES (2)
.621.25			151.4		2.99	NO
.623.30			169.2		2.60	YES (2)
.624.18.1		V_{REF}	158.5		2.27	NO
.624.38		V_{REF} +10	166.9	1.5	1.63	YES (2)
.625.39		V_{REF} -1+5	150.2	1.5	1.66	YES (1)
.626.34		V_{REF} +10	166.4	2.5	2.90	YES (1)
.627.32			164.2		2.69	YES (2)
.628.35			160.5		2.64	YES (1)
.630.23		V_{REF} +10	167.0	2.5	2.37	NO
.631.33		V_{REF} +10	168.0	2.5	3.01	YES (1)
.632.27		V_{REF} (AFM)	146.7	3.0	2.73	NO
.633.28		V_{REF}	164.3	3.0	3.06	
.634.25.1		V_{REF} +10	161.8	2.5	2.93	
.635.41		V_{REF} (AFM)	146.2	3.0	3.07	
.637.10.1	DRY	V_{REF}	155.8	1.5	1.92	
.637.14		V_{REF} +10	162.1	2.5	3.15	YES (2)
.638.12.1		V_{REF} +10	166.6	1.5	1.76	NO
.638.17.1		V_{REF}	159.9	2.5	2.76	NO
.638.06		V_{REF} +10	167.7	2.5	3.48	YES (2)
.639.11.1		V_{REF} +10	165.6	4.5	5.08	NO
.639.09.1		V_{REF}	160.2	4.5	4.71	NO
.639.12.2		V_{REF} +10	165.2	1.5	1.88	YES (2)

TABLE VIII (cont'd)

CONDITION NUMBER	IRIG TIME AT TOUCHDOWN (H/M/SEC.)	RADAR R/S AT TOUCHDOWN (FT./SEC.)	GROSS WEIGHT ($X10^{-3}$LB)	C.G. POSITION (% MAC)	SEGMENT ANALYZED AIR	TRAN	BRAKING
.601.01	7/39/5.07	2.4	357.9	14.4	X	X	X
.602.02	8/11/40.62	2.0	346.1	14.2	X	X	X
.603.07	8/40/43.52	3.3	335.6	13.9	X	X	X
.604.03	9/13/56.62	2.1	324.6	13.1	X	X	X
.605.08	9/45/11.78	2.6	313.7	12.0	X	X	X
.606.04	10/14/37.08	2.8	304.0	13.3	X	X	X
.607.10.3	10/35/55.12	3.8	296.9	12.6	X	X	-
.608.05	12/41/21.28	3.0	347.3	14.2	X	X	X
.611.19	8/13/31.64	2.1	355.6	14.4	X	X	X
.612.20	8/48/9.02	4.3	343.7	14.0	X	X	X
.613.36	9/17/31.38	2.2	334.1	13.8	X	X	X
.614.21	9/47/48.2	5.2	323.8	13.0	X	X	X
.615.22	10/16/44.35	4.1	315.4	12.1	X	X	X
.616.26	10/44/49.24	2.9	306.6	13.4	X	X	X
.617.18.2	11/10/12.04	4.3	298.8	12.8	X	X	-
.617.12.3	11/21/29.03	1.7	295.0	12.5	X	X	-
.618.37	13/21/3.82	2.4	327.1	13.3	X	X	X
.619.24	13/49/10.82	4.1	318.0	12.3	X	X	X
.620.31	14/17/3.26	3.1	308.8	13.6	X	X	X
.621.25	14/47/39.04	1.5	299.5	12.9	X	X	X
.623.30	7/50/32.34	1.7	356.0	14.3	X	X	X
.624.18.1	8/15/49.71	2.5	347.3	14.2	X	X	-
.624.38	8/41/10.8	2.1	338.8	13.9	X	X	X
.625.39	9/8/44.74	1.9	329.9	13.5	X	X	X
.626.34	9/36/32.57	4.0	321.2	12.7	X	X	X
.627.32	10/15/58.72	3.6	309.3	13.6	X	X	X
.628.35	10/44/11.3	4.4	301.0	13.0	X	X	X
.630.23	12/42/28.22	2.7	348.6	14.2	X	X	X
.631.33	13/13/27.15	2.3	338.5	14.0	X	X	X
.632.27	13/44/31.52	5.5	329.0	13.5	X	X	X
.633.28	14/13/00.84	3.0	319.8	12.5	X	X	X
.634.25.1	14/43/27.83	1.0	310.8	13.8	X	X	X
.635.41	15/10/53.4	4.4	302.6	13.1	X	X	X
.637.10.1	7/41/10.53	3.9	366.4	14.6	X	X	-
.637.14	7/50/57.99	2.6	362.6	14.6	X	X	X
.638.12.1	8/10/3.06	1.6	356.1	14.4	X	X	-
.638.17.1	8/19/56.06	2.4	352.4	14.2	X	X	-
.638.06	8/36/57.05	3.1	345.8	14.1	X	X	X
.639.11.1	8/55/12.90	2.5	339.7	14.0	X	X	-
.639.09.1	9/11/17.26	1.4	334.2	13.8	X	X	-
.639.12.2	9/21/57.52	2.3	330.4	13.6	X	X	X

TABLE VIII (cont'd)

CONDITION NUMBER	V_W* (KT)	WIND DIRECTION (DEG)	WIND RUNWAY COMPONENT (KT)	P_{AM} (IN Hg)	T_{AM} ($^{\circ}C$)	σ	TEST AIR DISTANCE (FEET)
.601.01	3.5	190	-3.3	26.41	8.3	.9037	2738
.602.02	4.0	285	-1.0		8.9	.9021	1940
.603.07	1.0	030	1.0		11.7	.8932	2421
.604.03	1.7	325	0.7		13.9	.8864	1907
.605.08	2.0	060	1.7		16.1	.8796	2020
.606.04	2.0	285	-0.5		17.2	.8763	1962
.607.10.3	1.5	070	1.1	26.41	19.4	.8694	2318
.608.05	7.0	145	-3.0	26.35	23.9	.8543	2291
.611.19	7.0	0	6.1	26.25	8.3	.8982	1723
.612.20	3.5	015	3.4		11.1	.8893	1689
.613.36	3.0	005	2.7		13.3	.8825	2492
.614.21	1.7	030	1.7		16.1	.8740	1486
.615.22	1.5	110	0.3		18.9	.8656	1237
.616.[illegible]	2.0	110	0.3		21.7	.8574	1744
.617.18.2	1.5	270	-0.8	26.24	23.9	.8507	1413
.617.12.3	1.7	0	1.5	26.24	25.0	.8476	2710
.618.37	3.5	300	0	26.18	29.4	.8333	2428
.619.24	2.5	145	-1.1	26.17	29.4	.8330	1783
.620.31	4.0	215	-4.[illegible]	26.16	30.0	.8310	1821
.621.25	7.0	210	-7.0	26.16	30.0	.8310	1314
.623.30	3.3	0	2.9	26.38	6.7	.9078	1946
.624.18.1	3.3	0	2.9	26.39	8.3	.9030	1771
.624.38	4.7	330	2.3	26.40	10.0	.8979	2593
.625.39	7.0	345	4.9	26.40	12.2	.8910	2899
.626.34	9.5	0	8.2	26.40	13.3	.8876	2022
.627.32	7.5	005	6.8	26.39	15.6	.8801	1782
.628.35	5.0	355	4.1	26.38	16.7	.8765	2264
.630.23	2.0	285	-0.5	26.32	21.7	.8597	1850
.631.33	5.0	105	1.3	26.29	21.7	.8587	1927
.632.27	3.0	180	-2.6	26.28	23.3	.8537	1576
.633.28	4.0	050	3.8	26.26	23.3	.8531	1566
.634.25.1	3.5	120	0	26.24	23.3	.8524	2208
.635.41	4.0	140	-1.4	26.24	23.9	.8507	1521
.637.10.1	2.8	295	-0.2	26.26	6.1	.9056	2054
.637.14	4.8	310	0.8	26.26	6.6	.9040	2010
.638.12.1	3.5	325	1.5	26.27	8.3	.8989	2355
.638.17.[illegible]	3.5	340	2.2		9.4	.8954	2272
.638.06	5.0	325	2.1		10.6	.8916	1822
.639.11.1	4.8	315	1.2		11.7	.8881	1454
.639.09.1	2.0	355	1.6	26.28	12.8	.8851	1538
.639.12.2	2.0	340	1.3	26.28	13.9	.8817	3155

*WIND ANEMOMETER HEIGHT IS 15 FEET ABOVE THE RUNWAY.

TABLE VIII (concl.)

CONDITION NUMBER	TEST TRANS DISTANCE (FEET)	TEST STOP DISTANCE (FEET)	V_{TD} TEST (KTAS)	V_{BA} TEST (KTAS)	AIR TIME 50' TO TD
.601.01	543	2562	152.3	145.7	9.95
.602.02	564	2412	150.2	143.5	7.36
.603.07	401	2640	155.9	151.3	8.85
.604.03	479	2043	145.3	140.0	7.56
.605.08	320	2483	158.9	154.6	7.41
.606.04	311	2497	148.6	145.9	7.69
.607.10.3	1266	-	144.6	131.0	9.29
.608.05	106	3110	163.4	162.5	7.89
.611.19	353	4526	152.0	148.6	6.80
.612.20	85	5707	151.4	150.7	6.59
.613.36	547	4590	159.8	151.3	9.11
.614.21	507	5575	152.2	147.6	5.74
.615.22	300	6137	148.2	145.4	4.87
.616.26	92	6819	152.1	151.6	6.59
.617.18.2	340	-	141.7	138.9	5.75
.617.12.3	652	-	148.9	141.9	10.32
.618.37	304	6438	151.9	148.8	8.99
.619.24	244	6433	160.4	158.4	6.42
.620.31	314	4568	150.5	147.8	6.75
.621.25	339	6861	148.8	145.8	4.92
.623.30	253	4738	160.1	157.7	7.07
.624.18.1	943	-	153.8	144.9	6.80
.624.38	912	3877	155.4	146.4	9.60
.625.39	364	4492	150.2	146.7	11.28
.626.34	183	5129	156.8	155.0	7.79
.627.32	195	4276	155.9	153.7	6.89
.628.35	383	4940	151.0	147.2	8.77
.630.23	690	7023	162.8	156.5	6.58
.631.33	149	7481	162.4	161.3	6.93
.632.27	468	5878	140.6	136.7	6.35
.633.28	769	5680	160.6	153.1	5.83
.634.25.1	966	5748	153.1	144.2	8.23
.635.41	2217	4360	146.0	124.7	6.05
.637.10.1	1009	-	150.6	140.8	7.86
.637.14	398	2437	154.2	149.1	7.49
.638.12.1	1190	-	154.7	142.6	8.70
.638.17.1	977	-	150.5	139.9	8.73
.638.06	1054	2096	163	149.8	6.57
.639.11.1	894	-	161.5	155.9	5.30
.639.09.1	960	-	156.0	150.4	5.82
.639.12.2	1121	2024	150.2	140.3	11.80

TABLE IX

B-737 LANDING PERFORMANCE SUMMARY
ANTI-SKID OPERATIVE ROSWELL N.M.
RUNWAY 03 ELEVATION 3669 FEET

CONDITION NUMBER	RUNWAY SURFACE CONDITION	FLAPS	TARGET APP. SPEED	ACTUAL APP. SPEED KTAS	TARGET γ DEG	ACTUAL γ DEG	THRUST REVERSER
75-2.001.1	DRY	40	VREF	138.5	2.5	2.06	YES (1)
75.2.002				143.2		1.85	YES (1)
75.4.003				125.0		2.36	YES (1)
75.2.004				134.0		2.27	NO
75.2.005				133.0		2.26	NO
75.4.006		40	VREF	127.5		2.30	NO
75.2.007		15	VREF-1	157.2		2.32	YES (1)
75.2.008		15	VREF-1	143.3		2.17	YES (1)
75.4.009	DRY	15	VREF-1	139.5		2.51	YES (1)
75.3.010	WET	40	VREF	139.4		1.95	YES (1)
75.3.011				131.8		1.83	YES (1)
75.3.012				126.2		2.28	YES (1)
75.3.013				136.1		2.27	NO
75.3.014				126.6		2.09	NO
75.3.015		40	VREF	128.6		1.93	NO
75.3.016		15	VREF-1	154.9		2.05	YES (1)
75.3.017.1		15	VREF-1	144.4		2.51	YES (1)
75.3.018		15	VREF-1	146.0		1.82	YES (1)
75.3.019		40	VREF	141.5		2.06	NO
75.3.020	WET			122.8		2.74	NO
75.2.021	DRY			145.2		2.37	NO
75.4.022	DRY		VREF	130.0	2.5	2.19	NO
75.3.023	WET		VREF+10	145.0	1.5	1.40	YES (1)
75.2.024	DRY	40	VREF+10	142.4		1.96	YES (1)
75.3.025	WET	15	VREF-1+5	143.2		2.03	YES (1)
75.2.026	DRY	15	VREF-1+5	141.9	1.5	1.99	YES (1)
75.2.999	DRY	40	VREF	134.5	-	-	NO
75.4.030	WET	40	VREF	138.2	2.5	2.08	NO
75.4.998	DRY	40	VREF-1	137.6	-	-	NO

TABLE IX (cont'd.)

CONDITION NUMBER	IRIG TIME AT TOUCHDOWN (H/M/S)	RADAR R/S AT TOUCHDOWN FT/SEC	GROSS WEIGHT ($X10^{-3}$LB.)	C.G POSITION (% MAC)	SEGMENT ANALYZED		
					AIR	TRANS	STOP
75-2.001.1	7/38/30.21	3.1	100.2	9.6	X	X	X
75.2.002	14/14/26.87	3.4	97.1	8.1			
75.4.003	7/44/26.44	3.4	90.9	6.3			
75.2.004	8/04/12.57	3.5	96.7	8.8			
75.2.005	14/36/31.16	2.8	94.1	7.2			
75.4.006	8/28/00.44	1.8	85.8	6.4			
75.2.007	13/48/53.6	3.3	100.5	9.7			
75.2.008	14/57/29.83	2.7	91.5	7.1			
75.4.009	8/05/16.18	2.3	88.7	6.2			
75.3.010	8/20/55.84	4.3	101.2	8.2			
75.3.011	10/50/03.34	3.9	95.7	9.1			
75.3.012	12/41/17.06	1.6	83.5	6.4			
75.3.013	8/51/33.22	2.1	97.1	8.8			
75.3.014	11/47/17.64	2.8	89.4	6.3			
75.3.015	16/25/08.41	3.0	81.3	6.7			
75.3.016	10/19/40.30	3.3	99.5	8.4			
75.3.017.1	15/08/08.83	4.1	89.5	6.3			
75.3.018	12/13/34.69	4.0	86.6	6.3			
75.3.019	9/51/51.56	1.0	102.5	8.0			
75.3.020	16/00/39.46	2.0	83.8	6.5			
75.2.021	13/26/39.72	4.7	103.5	9.2			
75.4.022	7/22/43.03	2.4	94	8.0			
75.3.023	11/17/51.35	3.1	92.6	7.2			
75.2.024	15/23/54.79	1.2	88.1	7.5			
75.3.025	15/34/03.22	1.4	86.7	6.3			
75.2.026	15/45/30.08	2.5	85.5	7.6	X	X	X
75.2.999	8/22/42.30	1.2	94.2	7.6	X	-	-
75.4.030	10/38/40.30	5.2	102.0	8.1	X	X	X
75.4.998	8/44/30.32	1.4	83.8	6.4	X	X	-

TABLE IX (cont'd.)

CONDITION NUMBER	V_w* (KT)	WIND DIRECTION (DEG)	WIND RUNWAY COMPONENT (KT)	P_{AM} (In Hg)	T_{AM} °C	σ	TEST AIR DIST. FT.
75-2.001.1	4.6	325	1.9	26.52	8.9	.905	1568
75.2.002	3.0	45	2.9	26.47	24.4	.857	1405
75.4.003	3.0	275	-1.3	26.54	5.6	.917	1578
75.2.004	6.0	320	2.1	26.53	11.1	.899	1464
75.2.005	1.5	145	-0.6	26.46	25.0	.855	1514
75.4.006	4.8	325	2.0	26.55	8.9	.907	1858
75.2.007	4.0	45	3.9	26.49	25.0	.855	1633
75.2.008	3.0	210	-3.0	26.46	25.0	.855	1713
75.4.009	2.6	295	-0.2	26.55	7.2	.912	1651
75.3.010	1.0	120	0.0	26.57	11.7	.898	1559
75.3.011	9.0	165	-6.4	26.56	17.8	.879	1913
75.3.012	7.5	175	-6.1	26.53	22.2	.865	1534
75.3.013	4.0	130	-0.7	26.57	14.4	.890	1610
75.3.014	9.5	180	-8.2	26.57	21.1	.870	2076
75.3.015	8.5	135	-2.2	26.47	25.6	.853	1736
75.3.016	10.5	135	-2.7	26.57	16.7	.883	1596
75.3.017.1	5.5	140	-1.9	26.48	25.6	.854	1409
75.3.017	5.0	145	-2.1	26.57	21.7	.868	1822
75.3.019	9.0	160	-5.8	26.57	15.6	.886	2235
75.3.020	10.0	165	-7.1	26.47	25.6	.853	1695
75.2.021	8.0	45	7.7	26.50	24.4	.858	1339
75.4.022	3.0	260	-1.9	26.54	4.5	.921	1635
75.3.023	7.5	155	-4.5	26.56	18.9	.876	2812
75.2.024	1.6	235	-1.5	26.44	25.6	.852	2294
75.3.025	11.5	155	-6.6	26.47	25.6	.853	1966
75.2.026	3.0	150	-1.5	26.44	25.6	.852	1782
75.2.999	10.5	340	6.7	26.54	13.3	.892	1539
75.4.030	1.5	350	1.1	26.55	18.3	.877	1669
75.4.998	4.2	330	2.1	26.56	10.6	.901	2018

*Wind Anemometer Height is 15 Feet Above Runway.

TABLE IX (Cont'd.)

CONDITION NUMBER	TEST TRANS DIST. FT.	TEST STOP DIST. FT.	V_{TD} TEST KTAS	V_{BA} TEST KTAS	AIR TIME 50' TO T.D. SEC
75-2.001.1	221	1844	141.0	138.3	6.72
75.2.002	128	1654	140.8	138.7	5.96
75.4.003	230	1487	126.7	123.9	7.27
75.2.004	144	1634	134.3	132.0	6.16
75.2.005	171	1740	132.4	130.5	6.72
75.4.006	186	1431	125.3	123.1	8.75
75.2.007	79	1988	154.7	153.4	6.33
75.2.008	205	1919	145.0	142.6	6.84
75.4.009	178	1759	139.0	137.6	7.00
75.3.010	190	3426	139.2	137.5	6.58
75.3.011	391	3813	131.6	127.9	8.10
75.3.012	285	3435	125.4	122.7	6.82
75.3.013	438	4299	135.6	131.2	6.94
75.3.014	216	4620	125.8	124.0	8.98
75.3.015	234	4305	126.0	123.9	7.88
75.3.016	345	5441	156.0	154.4	5.95
75.3.017.1	134	4680	143.3	142.6	5.70
75.3.018	433	4342	146.3	143.4	7.24
75.3.019	572	5804	140.7	136.4	8.88
75.3.020	273	4155	121.2	118.3	7.65
75.2.021	269	1788	145.3	141.5	5.77
75.4.022	321	1693	130.3	127.0	7.26
75.3.023	237	4095	137.3	134.6	11.31
75.2.024	269	1607	137.2	132.2	9.49
75.3.025	391	4773	143.6	141.9	7.66
75.2.026	203	1893	144.0	142.4	7.27
75.2.999	-	-	134.5	-	7.11
75.4.030	88	5220	134.6	133.9	7.27
75.4.998	413	-	128.3	123.4	9.04

TABLE X

CONCORDE [illegible] CONDITIONS - [illegible] EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.[illegible] RUNWAY CONDITION - WET

WATER DEPTH DATA

DATE AND A/C RUN	STATION	BEFORE AIRCRAFT				AFTER AIRCRAFT				AFTER GROUND VEHICLES			
		LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.
[illegible]	1	[illegible]	[illegible]	.04	[illegible]	.01	.01	.015	[illegible]	.005	.01	.01	.008
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	.01	.01	.01	.01	.005	.01	.008
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	.01	[illegible]	[illegible]	[illegible]	.005	.01	.007
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	.013	[illegible]	.005	.01	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.05	[illegible]	.04	.02	[illegible]
	7	[illegible]	[illegible]	[illegible]	[illegible]3	[illegible]	[illegible]	.03	[illegible]	.01	.01	.01	.01
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.04	[illegible]	[illegible]	.05	.01	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	.011	.01?
[illegible]	[illegible]				[illegible]				[illegible]				[illegible]
[illegible]	1	[illegible]	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.00	[illegible]	.00
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	[illegible]	[illegible]	.01	.01	.01	.01
	[illegible]	[illegible]	[illegible]	7	[illegible]	.01	[illegible]	[illegible]	.01	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	[illegible]	.01	[illegible]	.01	.01	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.04	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	1	[illegible]	.01	[illegible]	[illegible]	[illegible]	.01	.01	[illegible]	.01
	[illegible]				[illegible]				[illegible]				[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	.01	.005	.008	Missed Data			
		[illegible]	[illegible]	[illegible]	[illegible]	.01	.002?	.01	.009?	[illegible]	[illegible]	.01	.007?
[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	.012	.01	.01	.01	.01
	4	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	.03	.02	.005	.01	.02	[illegible]
	5	[illegible]	[illegible]	[illegible]	[illegible]	.01	.01	.01	.01	.005	.01	.01	.008
	6	[illegible]	[illegible]	[illegible]	[illegible]	.03	[illegible]	.03	.037	.03	.05	.02	.033
	7	.04	.06	.06	.053	.01	.03	.04	.027	.005	.01	.01	.008
	8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.06?	.03	.04?	[illegible]	.05	[illegible]	.04
	AVG.	[illegible]	[illegible]	.041	[illegible]	.014	[illegible]	.022	.021	.011	.021	.018	.017?
[illegible]	[illegible]				[illegible]				[illegible]				[illegible]

TABLE X (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET

AIRCRAFT: L-1011 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

WATER DEPTH DATA

DATE AND A/C RUN	STA-TION	BEFORE AIRCRAFT LEFT	CEN-TER	RIGHT	AVG.	AFTER AIRCRAFT LEFT	CEN-TER	RIGHT	AVG.	AFTER GROUND VEHICLES LEFT	CEN-TER	RIGHT	AVG.
[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.005	[illegible]	.005
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	.01	[illegible]	0	0	0	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	[illegible]	[illegible]	.01	.01	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	[illegible]	.005	[illegible]	.01	.007
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	.01	[illegible]	.01	[illegible]	0	.01	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	.01	.01	.01	.01	.01	.01	.01	.01
		[illegible]	[illegible]	.07	[illegible]	[illegible]	.07	[illegible]	.04	[illegible]	.04	.03	.03
	[illegible]	[illegible]	[illegible]	[illegible]	.054	[illegible]	[illegible]	.016	.017	.01	.015	.012	.012
[illegible]	[illegible]				[illegible]				0950				0954
10/24	1	[illegible]	[illegible]	[illegible]	[illegible]	.01	.01	.005	.008	.01	.01	.005	.006
	[illegible]	[illegible]	.07	[illegible]	.07	.01	.01	.01	.01	.01	0	0	.003
[illegible]	[illegible]	.05	.05	[illegible]	.047	.01	.01	.01	.01	.01	.01	.02	.013
	4	.05	[illegible]	.07	[illegible]	.01	[illegible]	.02	.017	.005	.02	.02	.015
	[illegible]	[illegible]	.05	.05	.037	.01	.01	.01	.01	0	0	.02	.007
	[illegible]	[illegible]	[illegible]	[illegible]	.047	[illegible]	.06	.02	.033	[illegible]	.05	.02	.03
	7	[illegible]	[illegible]	[illegible]	.053	.01	.03	.03	.023	.01	.005	.01	.008
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.06	.03	.05
	AVG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	.015	[illegible]	.016	.017
[illegible]	[illegible]				1007				1019				1026
10/24	1	.04	[illegible]	.03	[illegible]	.01	.01	.005	.008	.005	.005	.005	.005
		.05	[illegible]	.08	.07	.01	.01	.01	.01	0	0	.01	.003
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	[illegible]	.017	.01	.02	.01	.013
	4	.04	[illegible]	[illegible]	[illegible]	[illegible]	.03	.02	.025	.01	[illegible]	.01	.013
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	.01	[illegible]	.015	0	.01	.01	.007
	[illegible]	[illegible]	[illegible]	[illegible]	.043	[illegible]	.05	.02	.03	.01	.05	.02	.027
	7	[illegible]	.05	[illegible]	.047	.01	.03	.03	.023	0	0	.01	.003
	[illegible]	.09	.09	.10	[illegible]	.02	[illegible]	.06	.047	.03	.06	.03	.04
	AV	[illegible]	[illegible]	.052	.053	.014	.027	.023	.021	.008	.02	.013	.014
Av	[illegible]				[illegible]				[illegible]				1054

TABLE X (Cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M.   RUNWAY: 03   SURFACE: CONCRETE   MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011   RUNWAY SLOPE= -.0034   RUNWAY CONDITION - WET

WATER DEPTH DATA

		BEFORE AIRCRAFT				AFTER AIRCRAFT				AFTER GROUND VEHICLES			
DATE AND A/C RUN	STA-TION	LEFT	CEN-TER	RIGHT	AVG.	LEFT	CEN-TER	RIGHT	AVG.	LEFT	CEN-TER	RIGHT	AVG.
[illegible]	1	.03	.04	.03	.03[illegible]	.01	.01	.005	.005	.005	.005	.005	.005
	2	.04	.07	.07	.06	.01	.0	.01	.013	.01	.01	.01	.01
.15.		.0[illegible]	.06	.04	[illegible]	.01	.0[illegible]	.0[illegible]	.01[illegible]	[illegible]	.01	.01	.013
	4	.04	.06	.07	.05[illegible]	.01	.03	.03	.023	.01	.0[illegible]	[illegible]	.01[illegible]
	5	.04	.04	.04	[illegible]	[illegible]	.02	.02	.0[illegible]	.01	0	.01	.00[illegible]
		MISSED DATA				.02	[illegible]	.03	.0[illegible]	[illegible]	[illegible]	[illegible]	.013
	7	NO DATA THIS FAR DOWN RUNWAY											
	AVG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.012	.01	[illegible]	.01[illegible]
AVG	TIME				11[illegible]				1.1[illegible]				1116.[illegible]
[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.005	.005	.005	.00[illegible]	.005	[illegible]	.005
		[illegible]	[illegible]	[illegible]	[illegible]	.005		[illegible]	[illegible]3	.005	0	.005	.003
[illegible]		.0[illegible]	.0[illegible]	.04	.04[illegible]	0	0	.01	.003	0	0	.01	.003
	[illegible]	.0[illegible]	.0[illegible]	.0	[illegible]	0	[illegible]	[illegible]	[illegible]	0	.0[illegible]	.01	.01
	5	[illegible]	[illegible]	.0	[illegible]	.01	.01	.01	.01	0	0	.01	.003
	[illegible]	.0[illegible]	.09	.0	[illegible]	[illegible]	.0[illegible]	[illegible]	[illegible]	.0[illegible]	.03	.01	.0[illegible]
		.0[illegible]	.04	.06	[illegible]	.01	.01	.01	.01	0	0	.01	.00[illegible]
	[illegible]	.1[illegible]	.09	.0[illegible]	.09[illegible]	.0[illegible]	.0[illegible]	.04	.0[illegible]7	.01	.02	.01	.013
	AVG	.056	.064	.061	.060	.009	.014	.015	.013	.005	.009	.009	.00[illegible]
AVG	TIME				1[illegible]1[illegible]				1[illegible]				1[illegible]31
[illegible]	1	.02	.04	.02	.027	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		.04	.07	.08	.063	0	.01	[illegible]1	[illegible]7	0	0	[illegible]1	[illegible]
.24	[illegible]	.04	.0[illegible]	.04	.04	.01	.01	.02	.013	0	.01	.01	.00[illegible]
	[illegible]	.0[illegible]	.07	.07	.06[illegible]	0	.01	.02	.01	0	0	0	0
	[illegible]	.0[illegible]	[illegible]	.0	[illegible]	[illegible]	0	0	0	0	0	.01	.00[illegible]
		.04	.0[illegible]	.0[illegible]	[illegible]	.0[illegible]	.0[illegible]	.0	.03[illegible]	.0[illegible]	.0[illegible]	.0	.023
		[illegible]	.07	[illegible]7	.0	[illegible]	[illegible]1	[illegible]1	[illegible]7	[illegible]	[illegible]1	.01	[illegible]7
		.1[illegible]	.10	.1[illegible]	.1[illegible]	.01	.05	.03	.03	.01	.0[illegible]	.01	.01[illegible]
	AVG	.047	.062	.06	.057	.00[illegible]	.01[illegible]	.014	.013	.004	.013	.009	.009
AVG	TIME				1[illegible]40				1351				1358

TABLE X (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

WATER DEPTH DATA

197[illegible]		BEFORE AIRCRAFT				AFTER AIRCRAFT				AFTER GROUND VEHICLES			
DATE AND A/C RUN	STATION	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.
10/24	1	.02	.06	.04	.04	.005	.005	.005	.005	.005	.005	.005	005
	2	.07	.07	.08	.07[illegible]	.01	0	0	.003	0	0	0	0
.31	3	.05	.05	.05	.05	.01	.01	.02	.013	.01	.01	.01	.01
	4	.05	.07	.08	.067	.01	.01	.01	.01	0	0	0	0
	5	.02	.03	.05	.033	0	.01	.01	.007	0	.01	0	.003
	6	.06	.09	.06	.07	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	.01	[illegible]7
	7	.03	.05	.03	.037	.01	.01	.01	.01	.005	.005	.005	.005
	8	.10	.10	.13	.1[illegible]	.1	[illegible]	.05	[illegible]7	.01	.01	.01	.01
	AVG.	.051	.069	.064	.061	.009	.015	.016	.013	.005	.012	.005	.007
AVG	TIME				1408				1419				142[illegible]
10/24	1	.03	.05	.03	[illegible]	.01	.005	.01	.008	.005	.005	.005	.005
	2	.05	.08	.07	.067	0	0	0	0	0	0	0	0
.2[illegible]	3	.03	.06	.04	.043	.01	.01	.01	.01	.01	.01	.01	.01
	4	.04	.06	.07	.057	0	.01	0	.003	0	0	0	0
	5	.03	.02	.03	.027	0	.01	.01	.007	0	0	.01	.003
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.02	.0[illegible]	.02	.0[illegible]
	7	.05	.08	.08	.07	.01	.0[illegible]	.0[illegible]	.0	.005	.005	.005	.005
	8	.08	.08	.09	.083	.03	.03	.04	.033	.005	.01	.01	.008
	AVG	.046	.064	.059	.056	.01	.017	.015	.014	.005	.006	.007	.006
AVG	TIME				1436				1450				1458
10/25	1	.02	.04	.04	.033	.005	.0[illegible]	.01	.012	.005	.005	.005	.005
	[illegible]	.04	.05	.10	.063	.005	.005	.02	.010	-	-	-	-
	3	.07	.06	.05	.06	.01	.01	.02	.013	.01	.01	.01	.01
.[illegible]	4	.05	.07	.07	.063	.01	.03	.03	.023	.01	.02	.01	.013
	5	.05	.04	.06	.05	.01	.02	.02	.017	0	.01	.01	.007
	6	.04	.0	.06	.05	.0[illegible]	.0[illegible]	.0[illegible]	.0[illegible]	.02	.06	.02	.033
	7	.05	.07	.07	.0[illegible]	.01	.0[illegible]	.0[illegible]	.0[illegible]	.01	.01	.0	.013
	8	.10	.08	.10	.093	.05	.05	.05	.043	.0[illegible]	.02	.02	.0[illegible]7
	AVG	.052	.0[illegible]1	.069	.061	.01	.0[illegible]7	.0[illegible]	.0[illegible]1	.013	.01	.01[illegible]	.01[illegible]
AVG	TIME				[illegible]				75[illegible]				0759

TABLE X (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. **RUNWAY: 03** **SURFACE: CONCRETE** **MEAN ELEV. 3666 FEET**
AIRCRAFT: L-1011 **RUNWAY SLOPE= -.0034** **RUNWAY CONDITION - WET**

WATER DEPTH DATA

1973		BEFORE AIRCRAFT				AFTER AIRCRAFT				AFTER GROUND VEHICLES			
DATE AND A/C RUN	STATION	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.
10/25	1	.05	.06	.05	.053	.01	.02	.005	.012	.01	.005	.005	.007
	2	.02	[illegible]	[illegible]	.060	.005	.01	.03	.015	-		-	-
.18.1	3	[illegible]	.06	.05	.05	.01	.01	.02	.013	.01	.01	[illegible]	.013
	4	.06	.07	.07	.067	.01	.03	.03	.023	.01	.01	.02	.013
	5	.02	.03	.04	[illegible]	0	.01	.02	.01	0	0	.01	.003
	6	.02	.06	.03	.037	.03	.06	.04	.043	.02	.04	.02	.027
	7	-	-	-	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-	-	-	-
	AVG	.035	.06	.053	.049	.01	.023	.024	.019	.01	.013	.015	.013
AVG	TIME				0807				0817				[illegible]
10/25	1	.03	.05	.04	.04	.01	.01	.005	.008	.005	.005	.005	.005
	2	.03	.09	.09	.07	.005	.01	.01	.008	-	-	-	-
.38	3	.05	.05	.05	.05	.01	.01	.02	.013	0	0	.01	.003
	4	.05	.07	[illegible]	[illegible]	.01	.03	.03	.023	0	.02	.02	.013
	5	.03	.03	.05	.037	0	.01	.01	.007	0	0	.01	.003
	6	.04	.07	.04	.05	.05	.06	.03	.047	[illegible]	.05	[illegible]	.03
	7	.07	.07	.07	.07	.03	.03	.04	.033	.02	.01	.03	.02
	8	.10	.06	.10	.087	.03	.06	.06	.05	.03	.05	.02	.033
	AVG	.05	.061	.065	.059	.018	.027	.025	.023	[illegible]	.019	.016	.015
AVG	TIME				0830				0842.5				0849
10/25	1	.03	.06	.06	.05	.01	.01	.01	.01	.005	.005	.005	.005
	2	.03	.09	.09	.07	.005	.005	.01	.007	-	-	-	-
.39	3	.04	.06	.05	.05	.01	.01	.03	.017	.01	0	.02	.01
	4	.04	.07	.07	.06	.01	.02	.03	.02	.005	.01	.01	.008
	5	.03	.03	.04	.033	0	.01	.02	.01	0	.01	0	.003
	6	.04	.07	.03	.047	.02	.06	.02	.033	.02	.06	.03	.037
	7	.06	.06	.06	.06	.03	.03	.04	.033	.02	.02	.03	.023
	8	.09	.09	.08	.087	.02	.05	.06	.043	.03	.05	.03	.037
	AVG	.045	.072	.06	.058	.013	.024	.027	.021	.013	.022	.018	.018
AVG	TIME				0858				0910				0919

TABLE X (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. **RUNWAY: 03** **SURFACE: CONCRETE** **MEAN ELEV. 3666 FEET**
AIRCRAFT: L-1011 **RUNWAY SLOPE= -.0034** **RUNWAY CONDITION - WET**

WATER DEPTH DATA

1973 DATE AND A/C RUN	STATION	BEFORE AIRCRAFT LEFT	BEFORE AIRCRAFT CENTER	BEFORE AIRCRAFT RIGHT	BEFORE AIRCRAFT AVG.	AFTER AIRCRAFT LEFT	AFTER AIRCRAFT CENTER	AFTER AIRCRAFT RIGHT	AFTER AIRCRAFT AVG.	AFTER GROUND VEHICLES LEFT	AFTER GROUND VEHICLES CENTER	AFTER GROUND VEHICLES RIGHT	AFTER GROUND VEHICLES AVG.
10/25	1	.02	.04	.05	.037	.005	.005	.01	.007	.005	.005	.005	.005
	2	.02	.08	.08	.060	.005	.005	.02	.01	-	-	-	-
.34	3	.05	.06	.05	.053	.01	.01	.02	.013	.01	.01	.01	.01
	4	[illegible]	[illegible]	[illegible]	.073	.01	.02	.03	.02	.005	.01	.02	.012
	5	.02	.04	.04	.033	0	.01	.02	.01	0	0	.010	.003
	6	.04	.07	.04	.05	.02	.06	.06	.047	.02	.06	.04	.04
	7	.07	.07	.07	.07	.03	.04	.04	.037	.005	.005	.005	.005
	8	.10	.10	.09	.097	.03	.06	.06	.05	.02	.04	.01	.023
	AVG	.047	.067	[illegible]	.059	.014	.026	.032	.024	.009	.018	.014	.014
AVG	TIME				0927				0938				0945
10/25	1	.04	.05	.05	.047	.005	.005	.01	.007	.005	.005	.005	.005
	2	.01	.02	.08	.037	.005	.005	.01	.007	-	-	-	-
.32	3	.05	.04	.05	.047	.01	.02	.02	.017	.01	.01	.02	.013
	4	.04	.06	.06	.053	.005	.02	.02	.015	.005	.01	.02	.012
	5	.02	.03	.04	.03	0	.01	.02	.01	0	.01	.01	.007
	6	.02	.08	.06	.053	.02	.05	.02	.03	.01	.03	.03	.023
	7	.05	.06	.07	.06	.02	.03	.01	.02	.01	.01	.01	.01
	8	.07	.08	.06	.07	.01	.05	.04	.033	.02	.04	.04	.033
	AVG	.037	.052	.059	.049	.009	.024	.019	.017	.008	.016	.019	.014
AVG	TIME				1006				1018				1026
10/25	1	.05	.070	.060	.06	.01	.01	.01	.01	.005	.005	.005	.005
	2	.01	.02	.03	.02	.005	.005	.01	.007	-	-	-	-
.35	3	[illegible]	[illegible]	[illegible]	[illegible]	.01	.01	.02	.013	.01	.01	.02	.013
	4	.06	.07	.08	.07	.01	.02	.03	.02	.005	.01	.02	.012
	5	.03	.02	.05	.033	0	.01	.01	.007	0	.01	.01	.007
	6	.03	.08	.06	.057	.02	.04	.02	.027	.01	.05	.02	.027
	7	.05	.05	.07	.057	.02	.02	.03	.023	.01	.01	.01	.01
	8	.10	.09	.09	.093	.03	.05	[illegible]	[illegible]	.04	.01	.03	.027
	AVG	[illegible]	[illegible]	[illegible]	[illegible]	.013	[illegible]	[illegible]	[illegible]	.011	.015	.016	.014
AVG	TIME				1035.6				1045.6				1053

TABLE X (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

WATER DEPTH DATA

1973		BEFORE AIRCRAFT				AFTER AIRCRAFT				AFTER GROUND VEHICLES			
DATE AND A/C RUN	STATION	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.
10/25	1	.04	.06	.05	.05	.01	.01	.01	.01	.005	.005	.005	.005
	2	.04	.09	.08	.07	.01	.02	.02	.017	.01	.01	.01	.01
.23	3	.05	.04	.05	.047	.01	.03	.02	.02	.01	.01	.01	.01
	4	.05	.07	.08	.067	.01	.03	.01	.017	.005	.01	.005	.007
	5	.02	.03	.04	.03	.01	.01	.02	.013	0	0	.01	.003
	6	.03	.05	.06	.047	.01	.005	.01	.008	-	-	-	-
	7	.04	.06	.06	.053	.03	.03	.03	.03	.01	.01	0	.007
	8	.05	.08	.08	.07	.03	.06	.06	.05	.02	.05	.04	.037
	AVG	.04	.06	.062	.054	.015	.024	.022	.02	.008	.013	.011	.011
AVG	TIME				1233.5				1244				1253
10/25	1	.04	.08	.06	.06	.005	.005	.005	.005	.005	.005	.005	.005
	2	.06	.09	.09	.08	.01	.02	.02	.017	.01	.01	.01	.01
.33	3	.05	.06	.05	.053	.02	.01	.01	.013	.01	0	.01	.007
	4	.04	.06	.08	.06	.01	.02	.02	.017	0	0	0	0
	5	.03	.03	.06	.04	0	.01	.02	.01	0	0	.01	.003
	6	.05	.08	.06	.063	.01	.01	.01	.01	-	-	-	-
	7	.05	.05	.06	.053	.02	.02	.03	.023	.005	.005	.005	.005
	8	.09	.09	.01	.093	.06	.05	.06	.057	.02	.01	.01	.013
	AVG	.051	.067	.07	.062	.017	.018	.022	.019	.007	.004	.007	.006
AVG	TIME				1305				1315				1325
10/25	1	.04	.06	.04	.047	.005	.01	.005	.007	.005	.005	.005	.005
	2	.04	.08	.07	.063	.02	.02	.02	.02	.01	.01	.01	.01
.27	3	.05	.05	.03	.043	.01	.01	.02	.013	.02	.01	.01	.013
	4	.04	.06	.08	.06	0	.01	0	.003	0	.01	0	.003
	5	.03	.03	.05	.037	.01	.01	.01	.01	0	0	.01	.003
	6	.05	.07	.04	.053	.02	.01	.01	.013	.005	.005	.005	.005
	7	.04	.06	.07	.057	.01	.02	.02	.017	.01	.01	.01	.01
	8	.06	.07	.09	.08	.02	.03	.04	.03	.02	.01	.01	.013
	AVG	.046	.06	.059	.055	.012	.015	.016	.014	.009	.007	.007	.008
AVG	TIME				1334				1346				1354

TABLE X (concl.)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M.   RUNWAY: 03   SURFACE: CONCRETE   MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011   RUNWAY SLOPE= -.0034   RUNWAY CONDITION - WET

WATER DEPTH DATA

1973		BEFORE AIRCRAFT				AFTER AIRCRAFT				AFTER GROUND VEHICLES			
DATE AND A/C RUN	STATION	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.
10/25	1	[illegible]	[illegible]	.02	[illegible]	[illegible]	[illegible]	.005	.005	-	-	-	-
	[illegible]	.03	.07	.07	.057	.01	.01	.01	.01	.01	.01	.01	.01
.2[illegible]	3	.02	.05	.03	.033	.01	.02	.01	.013	0	.01	0	.003
	4	.03	.04	.06	.043	0	0	.01	.003	-	-	-	-
	5	.02	.01	.03	.02	0	0	0	0	0	0	0	0
	6	.04	.03	.03	.033	.005	.01	.01	.008	-	-	-	-
	7	.04	.04	.06	.047	.01	.02	.02	.017	.01	.01	.01	.01
	8	.08	.08	.10	.087	.01	.03	.03	.023	.03	.03	.01	.023
	AVG	.035	.045	.05	.043	.006	.012	.012	.01	.01	.012	.006	.009
AVG	TIME				1402.6				1414.[illegible]				1425
10/25	1	.04	.05	.02	.037	.01	.005	.01	.008	.005	.005	.005	.005
	2	.06	.09	.05	.067	.01	.01	.01	.01	.01	.01	.01	.01
.25.1	3	.04	.06	.04	.047	.01	.02	.02	.017	.01	.01	.01	.01
	4	.03	.05	.07	.05	.005	.02	.01	.012	.005	.01	.01	.008
	5	.03	.03	.03	.03	.01	.01	.01	.01	0	.01	.01	.007
	6	.03	.05	.04	.04	.01	.02	.01	.013	-	-	-	-
	7	.03	.05	.06	.047	.01	.02	.02	.017	C	.02	.01	.01
	8	.10	.08	.09	.09	.06	.06	.06	.06	.05	.05	.02	.04
	AVG	.045	.057	.05	.051	.016	.02	.019	.018	.011	.016	.011	.013
AVG	TIME				1434				1445				1453
10/24	1	.05	.05	.02	.04	.005	.005	.005	.005	.005	.005	.005	.005
	2	.04	.09	.09	.073	.01	.01	.01	.01	.01	.01	.01	.01
.41	3	.05	.04	.04	.043	.01	.02	.01	.013	.01	.01	.01	.01
	4	.05	.06	.07	.06	.01	.02	.02	.017	.01	.02	.005	.012
	5	.03	.03	.05	.037	.01	.01	.02	.013	0	0	.01	.003
	6	.03	.06	.04	.043	.01	.01	.01	.01	.005	.005	.005	.005
	7	.04	.05	.05	.047	.02	.02	.03	.023	.01	.02	.02	.017
	8	.07	.08	.07	.073	.06	.05	.06	.057	.02	.03	.03	.027
	AVG	.045	.057	.054	.052	.017	.018	.021	.018	.009	.012	.012	.011
AVG	TIME				1501.5				1512				1520

TABLE XI

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. **RUNWAY: 03** **SURFACE: CONCRETE** **MEAN ELEV. 3666 FEET**
AIRCRAFT: B-737 **RUNWAY SLOPE= -.0034** **RUNWAY CONDITION - WET**

WATER DEPTH DATA

1973		BEFORE AIRCRAFT				AFTER AIRCRAFT				AFTER GROUND VEHICLES			
DATE AND A/C RUN	STATION	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.
10/17	1	.05	.06	.10	.07	.02	.02	.02	.02	.02	.015	.015	.017
	2	.02	.09	.10	.07	.01	.01	.01	.01	.01	.01	.01	.01
.010	3	.05	.08	.08	.07	.01	.02	.01	.013	.02	.01	.01	.013
	4	.04	.06	.09	.065	.01	.01	.01	.01	TR	TR	.01	.01
	5	.04	.06	.07	.06	.02	.02	.02	.02	.01	.02	.01	.013
	6	.02	.06	.06	.047	.01	.01	TR	.01	TR	.01	.01	.01
	7	.08	.05	.08	.07	.05	.03	.07	.05	.03	.03	.05	.037
	8	.05	.06	.06	.057	.04	.05	.03	.04	.03	.03	.04	.033
	AVG	.044	.065	.08	.063	.021	.021	.022	.0213	.017	.017	.019	.0177
AVG	TIME				0809				0822				0826
10/17	1	.07	.07	.07	.07	.02	.02	.02	.02	.02	.02	.02	.02
	2	.08	.10	.10	.09	.01	.01	.03	.017	-	-	-	-
.013	3	.07	.08	.08	.077	.02	.01	-	.01	-	.02	-	.007
	4	.05	.06	.09	.067	.01	.02	.02	.017	-	.01	.01	.007
	5	.05	.06	.09	.067	.03	.03	.04	.033	.02	.02	.02	.02
	6	.07	.06	.05	.06	.01	.01	.03	.017	.01	.01	.01	.01
	7	.05	.05	.03	.043	.05	.05	.05	.05	.05	.05	.05	.05
	8	.05	.06	.07	.06	.04	.06	.05	.05	.05	.05	.04	.047
	AVG	.061	.067	.072	.067	.024	.026	.030	.027	.021	.026	.021	.023
AVG	TIME				0843				0853				0858
10/17	1	.06	.05	.05	.053	.01	.02	.02	.017	.01	.01	.02	.013
	2	.06	.09	.08	.077	.01	.01	.02	.013	.01	.01	.03	.017
.019	3	.08	.08	.08	.08	-	.02	.02	.013	.01	.02	-	.010
	4	.06	.10	.10	.087	.03	.01	.04	.027	.01	.01	.03	.017
	5	.07	.08	.10	.083	.02	.03	.05	.033	.02	.03	.02	.023
	6	.07	.07	.07	.07	.07	.01	.04	.04	.01	.02	.02	.017
	7	.08	.08	.06	.073	.03	.03	.06	.04	-	-	-	-
	8	.08	.06	.06	.067	.04	.03	.04	.037	.03	.03	.03	.03
	AVG	.07	.076	.074	.074	.026	.02	.036	.028	.014	.018	.025	.019
AVG	TIME				0942				0953				0959

TABLE XI (Cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M.   RUNWAY: 03   SURFACE: CONCRETE   MEAN ELEV. 3666 FEET
AIRCRAFT: B-737   RUNWAY SLOPE= -.0034   RUNWAY CONDITION - WET

WATER DEPTH DATA

1973		BEFORE AIRCRAFT				AFTER AIRCRAFT				AFTER GROUND VEHICLES			
DATE AND A/C RUN	STA-TION	LEFT	CEN-TER	RIGHT	AVG.	LEFT	CEN-TER	RIGHT	AVG.	LEFT	CEN-TER	RIGHT	AVG.
10/17	1	.06	.07	.07	.067	.01	.01	.02	.013	.01	.01	.02	.013
	2	.08	.10	.10	.093	.01	.01	.03	.017	.005	.01	.03	.015
.016	3	.08	.07	.07	.073	.02	.01	.02	.017	.005	.01	.005	.007
	4	.07	.10	.07	.080	.005	.01	.01	.008	.005	.01	.02	.012
	5	.06	.07	.09	.073	.02	.02	.02	.02	.02	.01	.01	.013
	6	.07	.10	.06	.077	.01	.01	.005	.008	.01	.01	.005	.008
	7	.04	.08	.08	.067	.02	.03	.03	.027	.02	.02	.02	.02
	8	.05	.05	.07	.057	.03	.03	.03	.03	.03	.03	.04	.033
	AVG	.064	.08	.076	.073	.015	.016	.021	.0174	.013	.014	.018	.015
AVG	TIME				10:08.5				10:21				10:29
10/17	1	.05	.06	.06	.057	.01	.01	.02	.013	.01	.01	.01	.01
	2	.08	.10	.10	.093	.01	.01	.03	.017	.005	.005	.03	.013
.011	3	.08	.08	.07	.077	.005	.02	.005	.010	.01	.01	.005	.008
	4	.05	.08	.10	.077	.005	.01	.01	.008	.005	.01	.02	.012
	5	.07	.07	.08	.073	.02	.02	.03	.023	.01	.02	.01	.013
	6	.04	.06	.05	[illegible]	.005	.02	.02	.015	.01	.01	.02	.013
	7	.05	.06	.08	.063	.02	.03	.04	.03	-	-	-	-
	8	.04	.07	.08	.063	.05	.04	.03	.04	.03	.04	.04	.037
	AVG	.057	.072	.077	.069	.016	.02	.023	.019	.011	.015	.019	.015
AVG	TIME				1039				1052				1056.5
10/17	1	.04	.07	.07	.06	.01	.01	.02	.013	.01	.01	.015	.012
	2	.06	.10	.10	.087	.01	.02	.03	.02	.005	.01	.02	.012
.023	3	.08	.08	.07	.077	.005	.01	.005	.007	.005	.01	.005	.007
	4	.06	.07	.07	.067	.005	.01	.01	.008	.005	.005	.02	.01
	5	.07	.08	.10	.083	.02	.03	.04	.03	.01	.01	.02	.013
	6	.08	.07	.07	.073	.005	.02	.02	.015	.005	.01	.01	.008
	7	.05	.07	.04	.053	.02	.04	.02	.027	.02	.03	.02	.023
	8	.05	.04	.05	.047	.03	.03	.03	.03	.03	.03	.03	.03
	AVG	.061	.072	.071	.068	.013	.021	.022	.019	.011	.014	.017	.014
AVG	TIME				1106				1119				1127

TABLE XI [illegible]

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: B-737 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

WATER DEPTH DATA

DATE AND A/C RUN	STATION	BEFORE AIRCRAFT LEFT	BEFORE AIRCRAFT CENTER	BEFORE AIRCRAFT RIGHT	BEFORE AIRCRAFT AVG.	AFTER AIRCRAFT LEFT	AFTER AIRCRAFT CENTER	AFTER AIRCRAFT RIGHT	AFTER AIRCRAFT AVG.	AFTER GROUND VEHICLES LEFT	AFTER GROUND VEHICLES CENTER	AFTER GROUND VEHICLES RIGHT	AFTER GROUND VEHICLES AVG.
10/17	1	.05	.06	.06	.057	.01	[illegible]	[illegible]	.015	[illegible]	.01	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	.10	[illegible]	[illegible]	.01	.03	.017	[illegible]	[illegible]	[illegible]	[illegible]
.014		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	[illegible]	.005	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	7	[illegible]	[illegible]	[illegible]	[illegible]	.02	[illegible]	.03	[illegible]	[illegible]	.01	[illegible]	[illegible]
	8	.04	.05	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	AVG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.019	.017	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	AVG	[illegible]			1136.5				[illegible]				[illegible]
10/17	1	.04	.05	.05	.047	.01	.02	.015	.015	.01	.01	.01	.01
	2	.100	.060	.10	.087	.01	.01	.03	.017	.01	.01	.04	[illegible]
.018	[illegible]	.08	.09	.08	.083	.005	.01	.02	[illegible]	.005	.005	.005	.005
	4	.07	.08	.08	.077	.005	.01	.01	.008	.005	.005	.01	.007
	5	.08	.07	.10	.083	.02	.03	.02	.023	.01	.02	.02	[illegible]
	6	.04	.07	.06	.057	.005	.02	[illegible]	.012	.01	.01	[illegible]	[illegible]
	7	.03	.07	.08	.06	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	[illegible]
	8	.06	.08	.06	.067	.04	.05	.04	.043	[illegible]	.04	.03	[illegible]
	AVG	.062	.071	[illegible]	.070	.014	.021	.022	.019	.014	.014	.020	[illegible]
	AVG	TIME			[illegible]				[illegible]				[illegible]
10/17	1	.03	[illegible]	.05	.043	.01	.01	.01	.01	.01	.015	.01	[illegible]
	[illegible]	[illegible]	.10	.10	[illegible]	[illegible]	.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	.01	.01	.01	.01
	4	[illegible]	.06	[illegible]	[illegible]	[illegible]	.005	.01	.007	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	[illegible]	.017
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	.07	[illegible]	[illegible]	[illegible]	[illegible]	.04	[illegible]	.01	[illegible]	.01	.017
	AVG	[illegible]	[illegible]	.076	.065	.011	.018	.022	.017	.008	.016	.016	.013
	AVG	TIME			1230.6				1243				1247.6

TABLE XI (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: B-737 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

WATER DEPTH DATA

1973		BEFORE AIRCRAFT				AFTER AIRCRAFT				AFTER GROUND VEHICLES			
DATE AND A/C RUN	STATION	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.
10/17	1	.04	.06	.05	.05	.01	.01	.015	.012	.01	.01	.01	.01
	2	[illegible]	.10	.10	[illegible]	.01	.005	.03	.015	.005	.01	.03	.015
[illegible]	3	.07	.09	.08	.08	.005	.01	.005	.007	.01	.02	.005	.012
	4	[illegible]	[illegible]	[illegible]	[illegible]	.005	.01	[illegible]	[illegible]	[illegible]	[illegible]	.01	.007
	5	[illegible]	[illegible]	.10	.087	.01	.02	.02	.017	.005	[illegible]	.01	.017
	6	.07	.07	.05	.063	.01	.01	.01	.01	.01	.01	.005	.008
	7	.07	.07	.07	.07	.01	.03	.03	.023	-	-	-	-
	8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.04	.04	[illegible]	[illegible]	[illegible]	.03	.027
	AV.	[illegible]	[illegible]	[illegible]	[illegible]	.011	.017	.021	.017	.009	[illegible]	[illegible]	.013
AV	TIME				1456				1510				1515
10/17	1	.04	.06	.05	.05	.01	.01	.013	.011	.01	.01	.01	.01
	2	.06	.09	.09	.08	.01	.01	.06	.027	.01	.01	.04	.02
[illegible]	3	.06	.06	.08	.067	[illegible]	.01	[illegible]	[illegible]	.01	[illegible]	.005	.012
	4	.08	.09	.09	.087	.01	.01	.02	.013	.005	.01	.01	.008
	5	.08	.09	.09	.087	.02	.03	.02	.023	.01	.02	.01	.013
	6	.07	.07	.06	.067	.01	.04	.01	.03	.01	.01	.01	.01
	7	.05	.06	.06	[illegible]	.02	.02	.02	.02	.02	.02	.02	.02
	8	[illegible]	[illegible]	.10	[illegible]	.05	.04	.05	.047	.04	.03	.03	.033
	AV.	.062	.075	.077	.071	.017	[illegible]	[illegible]	[illegible]	.014	.016	.017	.016
AV	TIME				[illegible]				1536				1541
10/17	1	[illegible]	[illegible]	[illegible]	[illegible]	.01	.01	.01	.01	.01	.01	.01	.01
	2	[illegible]	.10	.10	.095	.005	.01	.03	.015	.005	.005	.02	.01
[illegible]	3	.08	.08	.07	.077	.01	.01	.005	.008	.01	.01	.005	.006
	4	.05	.06	.10	.077	.01	.01	.02	.013	.005	.01	.01	[illegible]
	5	[illegible]	[illegible]	.10	[illegible]	.01	.03	.03	.023	.005	.02	.02	.015
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01	.01	.013	.005	.01	.01	.009
	[illegible]	[illegible]	[illegible]	.06	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	.09	.087	.04	.05	.05	.047	.05	[illegible]	[illegible]	[illegible]
	AVG	.061	.08	.08	.074	.015	.019	.023	.019	.014	.016	.018	.016
AVG	TIME				1551				1602				1606

TABLE XI

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. **RUNWAY:** 03 **SURFACE:** CONCRETE **MEAN ELEV.** 3666 FEET
AIRCRAFT: B-737 **RUNWAY SLOPE=** -.0034 **RUNWAY CONDITION** - WET

WATER DEPTH DATA

1973 DATE AND A/C RUN	STATION	BEFORE AIRCRAFT				AFTER AIRCRAFT				AFTER GROUND VEHICLES			
		LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.
10/17	1	.06	.06	.06	.06	.015	.02	.02	.018	.01	.01	.01	.01
	2	.05	.10	.10	.083	.01	.01	.04	.02	.005	.01	.04	.018
.015	3	.08	.07	.08	.077	.01	.02	.005	.012	.005	.01	.005	.007
	4	.06	.08	.08	.073	.02	.04	.03	.03	.01	.02	.02	.017
	5	.08	.10	.10	.093	.01	.03	.03	.023	.005	.02	.02	.015
	6	.05	.07	.06	.06	.02	.02	.01	.017	.01	.01	.03	.017
	7	.05	.06	.05	.053	.02	.02	.02	.02	.02	.03	.03	.027
	8	.05	.05	.07	.057	.04	.01	.01	.02	.04	.01	.01	.02
	AVG	.06	.074	.075	.070	.018	.021	.020	.02	.013	.015	.02	.016
AVG	TIME				1617				1627				1632
10/18	1	.025	.04	.03	.032	.005	.005	.005	.005	.005	.01	.01	.008
	2	.070	.10	.10	.09	.005	.005	.040	.017	.005	.005	.03	.013
.030	3	.08	.08	.08	.08	.005	.005	.005	.005	.005	.005	.01	.007
	4	.05	.08	.09	.073	.01	.01	.01	.01	.005	.01	.005	.007
	5	.07	.09	.08	.08	.01	.02	.03	.02	.01	.01	.02	.013
	6	.03	.06	.04	.043	.01	.01	.01	.01	.01	.01	.01	.01
	7	.07	.08	.06	.07	.03	.02	.04	.03	.02	.01	.04	.023
	8	.06	.08	.10	.08	.03	.03	.03	.03	.02	.02	.03	.023
	AVG	.057	.076	.072	.068	.013	.013	.021	.016	.01	.01	.019	.013
AVG	TIME				1028				1041				1047
10/18	1	.025	.05	.03	.035	.01	.005	.005	.007	.005	.005	.005	.005
	2	.06	.09	.10	.083	.01	.02	.02	.017	-	-	-	-
.035	3	.09	.09	.08	.083	.005	.005	.005	.005	.005	.005	.005	.005
	4	.04	.07	.08	.063	.005	.01	.01	.008	-	-	-	-
	5	.07	.09	.08	.08	.01	.02	.02	.017	.005	.01	.02	.012
	6	.03	.06	.03	.04	.02	.01	.005	.012	.01	.005	.01	.008
	7	.07	.07	.07	.07	.03	.03	.02	.026	.02	.02	.03	.023
	8	.06	.08	.08	.073	.04	.05	.05	.047	.03	.04	.05	.040
	AVG	.055	.074	.069	.066	.016	.019	.017	.017	.012	.014	.02	.015
AVG	TIME				1056				1105				1114

TABLE XI (cont'd.)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: B-737 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

WATER DEPTH DATA

1973		BEFORE AIRCRAFT				AFTER AIRCRAFT				AFTER GROUND VEHICLES			
DATE AND A/C RUN	STA-TION	LEFT	CEN-TER	RIGHT	AVG.	LEFT	CEN-TER	RIGHT	AVG.	LEFT	CEN-TER	RIGHT	AVG.
10/18	1	.015	.05	.02	.028	.005	.005	.005	.005	.005	.005	.005	.005
	2	.020	.07	.09	.06	.005	.01	.03	.015	.005	.01	.03	.015
.035.1	3	.03	.05	.05	.043	.005	.005	.005	.005	.005	.005	.005	.005
	4	-	-	-	-	.005	.01	.01	.008	-	-	-	-
	5	.06	.07	.08	.07	.01	.02	.02	.017	.005	.01	.02	.012
	6	.04	.06	.04	.047	.01	.01	.01	.01	.01	.01	.005	.008
	7	.06	.06	.06	.06	.03	.04	.03	.033	.03	.03	.04	.033
	8	.05	.07	.08	.067	.03	.03	.04	.033	.01	.01	.04	.02
	AVG	.039	.061	.06	.053	.012	.016	.019	.016	.01	.011	.021	.014
AVG	TIME				1129				1140				1144
10/18	1	.03	.05	.03	.038	.005	.005	.005	.005	.005	.005	.005	.005
	2	.06	.10	.10	.087	.005	.005	.02	.01	.005	.005	.02	.01
.031	3	.08	.07	.05	.067	.005	.005	.005	.005	.005	.005	.005	.005
	4	.03	.07	.08	.06	.01	.02	.03	.02	.01	.02	.01	.013
	5	.06	.06	.08	.067	.01	.02	.02	.017	.005	.01	.01	.008
	6	.03	.06	.06	.05	.01	.01	.01	.01	.03	.01	.005	.015
	7	.07	.07	.07	.07	.04	.04	.04	.04	.01	.02	.01	.013
	8	.06	.08	.10	.08	.03	.04	.04	.033	.03	.03	.04	.033
	AVG	.052	.07	.071	.065	.014	.018	.021	.017	.012	.013	.013	.013
AVG	TIME				1155				1206				1211
10/18	1	.04	.055	.035	.043	.005	.005	.005	.005	.005	.005	.005	.005
	2	.07	.10	.10	.09	.005	.01	.03	.015	.005	.01	.03	.015
.033	3	.05	.06	.06	.057	.005	.005	.005	.005	.005	.005	.005	.005
	4	.02	.05	.07	.047	.005	.01	.01	.008	-	-	-	-
	5	.05	.06	.08	.063	.01	.02	.02	.017	.01	.01	.02	.013
	6	.06	.08	.05	.063	.02	.005	.005	.010	.02	.005	.02	.015
	7	.07	.07	.07	.07	.01	.02	.02	.016	.02	.02	.02	.02
	8	.06	.07	.10	.077	.03	.04	.04	.037	.01	.02	.01	.013
	AVG	.052	.068	.07	.064	.011	.014	.017	.014	.01	.01	.016	.012
AVG	TIME				1222				1232.5				1238

TABLE XI (concl.)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: B-737 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

WATER DEPTH DATA

1973		BEFORE AIRCRAFT				AFTER AIRCRAFT				AFTER GROUND VEHICLES			
DATE AND A/C RUN	STATION	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.	LEFT	CENTER	RIGHT	AVG.
10/18	1	.045	.055	.05	.05	.01	.005	.005	.007	.005	.005	.005	.005
	2	.07	.07	.10	.08	.01	.02	.04	.023	.01	.01	.01	.01
.036	3	.06	.06	.05	.057	.005	.005	.005	.005	.005	.005	.005	.005
	4	.04	.08	.08	.067	.01	.01	.01	.01	.005	.005	.005	.005
	5	.06	.06	.08	.067	.01	.02	.02	.017	.01	.02	.02	.017
	6	.06	.07	.04	.057	.01	.005	.02	.012	.005	.02	.02	.015
	7	.07	.07	.07	.07	.01	.03	.02	.02	.01	.03	.02	.02
	8	.05	.08	.10	.077	.04	.03	.04	.037	.03	.03	.04	.033
	AVG	.057	.068	.071	.06[illegible]	.013	.016	.02	.016	.01	.016	.015	.014
AVG	TIME				1[illegible]48				1258.5				1302

TABLE XII

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/24	1	TANKER	0754	0808										
	1	WD	08	02	.055	.064	.064							
	1	MM	0808	0811	LEFT	SIDE	OF ℄	.480						
	1	SKIDD	0808	0811	RIGHT	SIDE	OF ℄		.750					
	1	DBV_1	0809	0812	LEFT	SIDE	OF ℄			2.26				
	1	MILES	0810	0812	RIGHT	SIDE	OF ℄				.365			
	1	DBV_2	0810	0813	LEFT	SIDE	OF ℄							2.0*
	.19	A/C	0814	0818								355	7	
	2	WD	08	16	.019	.025	.026							
	2	MM	0819	[illegible]				.600						
	2	SKIDD	0819	0823					.810					
	2	DBV_1	0821	0823						2.18				
	2	MILES	0822	0824							.393			
	2	DBV_2	082[illegible]	0824										1.80*
	3	WD	08	24	.012	.018	.011							
	2	TANKER	0830	0846										
	4	WD	08	39	.056	.061	.061							
	3	MM	0844	0846				.450						
	3	SKIDD	0844	0846					.740					
	3	DBV_1	0845	0847						2.49				
	3	MILES	0846	0848							.344			
	3	DBV_2	0846	0848										2.20*
	.20	A/C	0849	0854								020	3	
	5	WD	08	50	.017	.024	.025							
	4	MM	0855	0857				.520						
	4	SKIDD	0855	0857					.780					
	4	DBV_1	0856	0858						2.26				
	4	MILES	0857	0859							.373			
	4	DBV_2	0857	0859										2.00*
	6	WD	0900		.012	.019	.015							

NOTE:
1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 6[illegible] MPH. TO STOP.
4. MILES TRAILER [illegible] ARE AVERAGE FROM 85 TO 0 KNOTS.

*DBV #2 was run in a drier path to the left of DBV #1

TABLE XII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE* -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/24	3	TANKER	0900	0914										
	7	WD	09	08	.052	.060	.061							
	5	MM	0913	0915				.380						
	5	SKIDD	0913	0915					.660					
	5	DBV_1	0914	0916						2.59				
	5	MILES	0915	0916							.321			
	5	DBV_2	0915	0917										2.34*
	36	A/C	0918	0922								000	3	
	8	WD	09	20	.014	.027	.022							
	6	MM	0923	0925				.44						
	6	SKIDD	0923	0925					.74					
	6	DBV_1	0924	0926						2.46				
	6	MILES	0925	0926							.369			
	6	DBV_2	0925	0927										2.[illegible]8*
	9	WD	09	28	.011	.021	.018							
	4	TANKER	0929	0943										
	10	WD	09	36	.047	.060	.055							
	7	MM	0942	0944				.[illegible]70						
	7	SKIDD	[illegible]	[illegible]					.680					
	7	DBV_1	0943	0945						2.58				
	7	MILES	0944	0946							.328			
	7	DBV_2	0944	0947										2.16*
	21	A/C	0949	0955								030	2	
	11	WD	09	50	.014	.022	.016							
	8	MM	0950	0953				.410						
	8	SKIDD	0950	0953					.710					
	8	DBV1	0951	0953						2.45				
	8	MILES	0952	0953							.346			
	8	DBV2	0952	0954										[illegible].20*
	12	WD	09	54	.010	.015	.012							

NOTE: 1.MU-METER VALUES AT 40 MPH.
2.SKIDDOMETER VALUES AT 40 MPH.
3.DBV SDR FROM 60 MPH. TO STOP.
4.MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: [illegible] RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/24	5	TANKER	0959	1015										
	13	WD	10	[illegible]	[illegible]	[illegible]	[illegible]							
	9	MM	1012	[illegible]				[illegible]						
	9	SKIDD	[illegible]	[illegible]					[illegible]					
		DBV1	[illegible]	[illegible]						[illegible]				
		MILES	[illegible]	[illegible]							[illegible]			
		DBV2	[illegible]	[illegible]										[illegible]
	[illegible]	A/C	[illegible]	[illegible]								[illegible]	2	
	[illegible]	WD	[illegible]	[illegible]	.015	.026	.019							
	10	MM	1022	1024				.410						
	10	SKIDD	1022	1024					.700					
	10	DBV1	1023	1025						2.46				
	10	MILES	1024	1026							.359			
	10	DBV2	1024	1026										2.07*
	15	WD	10	26	.015	.021	.016							
	[illegible]	TANKER	1027	1034										
	16	WD	10	37	.046	.061	.052							
	11	MM	1041	1043				.35						
	11	SKIDD	1041	1043					.61					
	11	DBV1	1042	1044						2.64				
	11	MILES	[illegible]	1044							.317			
	11	DBV2	1043	1044										2.38*
	[illegible]	A/C	1045	1049								110	2	
	17	WD	10	47	.014	.027	[illegible]							
	12	MM	1049	1051				.410						
	12	SKIDD	1049	1051					.700					
	12	DBV1	1050	1052						2.46				
	12	MILES	1051	[illegible]							.348			
	12	DBV2	1051	1054										2.19*
	18	WD	10	54	.008	.020	.013							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/24	7	TANKER	1057	11[illegible]	WET A TO D ONLY FOR TOUCH AND GO.									
	19	WD	11	03	.03[illegible]	.054	.050							
	13	MM	110[illegible]	1107				.320						
	13	SKIDD	1106	1107					.[illegible]20					
	13	DBV_1	1107	1108						2.75				
	13	MILES	1108	1109							--			
	13	DBV_2	1108	1109										2.55*
	18.2	A/C	1110	1111								255	1.5	
	20	WD	11	12	.015	.027	.019							
	14	MM	1113	1115				.390						
	14	SKIDD	1113	1115					.690					
	14	DBV_1	1114	1116						2.55				
	14	MILES	1115	1117							--			
	14	DBV_2	1115	1117										1.67*
	21	WD	11	16.5	.012	.016	.014							
	8	TANKER	1301	1318										
	22	WD	13	10	.056	.064	.061							
	15	MM	1315	1318				.390						
	15	SKIDD	1315	1318					.640					
	15	DBV_1	1316	1319						2.59				
	15	MILES	1317	1319							.401			
	15	DBV_2	1317	1320										2.49**
	.37	A/C	1321	1325								310	3	
	23	WD	13	23	.009	.014	.015							
	16	MM	1327	1329				.520						
	16	SKIDD	13[illegible]7	13[illegible]9					.670					
	16	DBV_1	1328	1330						2.1[illegible]				
	16	MILES	1329	1330							.441			
	16	DBV_2	1329	1331										2.11**
	24	WD	13	31	.005	.009	.009							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

** DBV_2 tracking DBV_1

TABLE XII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/24	9	TANKER	1331	1348										
	25	WD	13	40	.047	.062	.062							
	17	MM	1345	1348				.360						
	17	SKIDD	1345	1348					.620					
	17	DBV_1	134[illegible]	134[illegible]						2.53				
	17	MILES	1347	1349							.406			
	17	DBV_2	1347	1349										2.36**
	24	A/C	1349	1352								140	2	
	26	WD	13	51	.006	.019	.014							
	18	MM	1353	1355				.460						
	18	SKIDD	1353	1355					.690					
	18	DBV_1	1355	1357						2.30				
	18	MILES	1356	1358							.440			
	18	DBV_2	1356	1358										2.14**
	27	WD	13	58	.004	.013	.009							
	10	TANKER	1359	141[illegible]										
	2[illegible]	WD	14	0[illegible]	.0[illegible]1	.06[illegible]	.06[illegible]							
	19	MM	141[illegible]	141[illegible]				.37[illegible]						
	19	SKIDD	141[illegible]	1414					.590					
	19	DBV_1	1413	1415						[illegible].65				
	19	MILES	1414	1416							.395			
	19	DBV2	1414	1417										2.60R
	31	A/C	1417	1422								210	4	
	29	WD	14	19	.009	.015	.016							
	20	MM	1423	1425				.490						
	20	SKIDD	1423	1425					.670					
	20	DBV_1	1424	1427						2.32				
	20	MILES	1425	1427							.434			
	20	DBV_2	ABORT											--
	30	WD	14	27	.005	.012	.005							

NOTE: 1.MU-METER VALUES AT 40 MPH.
2.SKIDDOMETER VALUES AT 40 MPH.
3.DBV SDR FROM 60 MPH. TO STOP.
4.MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

R - DBV_2 on right side of runway
DBV_1 on left side of runway

TABLE XII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEH-ICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CEN-TER	RIGHT	MU-METER	SKIDD-OMETER	DBV SDR #1	MILES TRAI-LER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/24	11	TANKER	1429	1444										
	31	WD	14	36	.046	.064	.059							
	21	MM	1441	1445				.380						
	21	SKIDD	1441	1445					.570					
	21	DBV_1	1442	1446						2.74				
	21	MILES	1443	1446							.401			
	21	DBV_2	1443	1446										2.56R
	.25	A/C	1448	1452								000	3	
	32	WD	14	50	.010	.017	.015							
	22	MM	1453	1456				.51						
	22	SKIDD	1453	1456					.67					
	22	DBV_1	1454	1457						2.36				
	22	MILES	1455	1457							.425			
	22	DBV_2	1455	1457		D A T	A I N	C O M	P L E	T E				--
	33	WD	14	58	.005	.006	.007							
10/25	1	TANKER	0729	0744										
	1	WD	07	40	.052	.061	.069							
	1	MM	0744	0746	RIGHT	SIDE	℄	.480						
	1	SKIDD	0744	0746	SMOOTH	TIRE	LEFT OF ℄		.660					
	1	DBV_1	0745	0747	RIGHT	SIDE	℄			2.44				
	1	MILES	0746	0748	LEFT	SIDE	℄				.417			
	1	DBV_2	0746	0748	RIGHT	SIDE	℄							2.37**
	.30	A/C	0750	0754								000	3	
	2	WD	07	52	.012	.027	.025							
	2	MM	0755	0757				.54						
	2	SKIDD	0755	0757					.680					
	2	DBV1	0756	0758						2.29				
	2	MILES	0757	0759							.461			
	2	DBV_2	0757	0759										2.28**
	2	WD	07	59	.013	.019	.013							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/25	2	TANKER	0759	0806	WET A	TO D	MARKER	ONLY						
	4	WD	08	07	.0[illegible]5	.060	.053							
	3	MM	0810	081[illegible]				.460						
	3	SKIDD	0810	0813					.610					
	3	DBV_1	0811	0814						[illegible].5[illegible]				
	3	MILES	081[illegible]	0814							--			
	3	DBV_2	0812	0814										2.3[illegible]**
	.18.1	A/C	0815	TOUCH	GO							010	3	
	5	WD	08	17	.010	.023	.024							
	4	MM	0817	0819				.490						
	4	SKIDD	0817	0819					.65					
	4	DBV_1	0819	0821						2.43				
	4	MILES	0820	0822							--			
	4	DBV_2	0820	0822										2.36**
	6	WD	08	22	.010	.013	.015							
	3	TANKER	0821	0835										
	7	WD	08	30	.050	.061	.065							
	5	MM	0834	0837				.450						
	5	SKIDD	0834	0837					.620					
	5	DBV_1	0835	0838						2.59				
	5	MILES	0836	0838							.389			
	5	DBV_2	0836	0838										2.54**
	.38	A/C	0841	0845								330	5	
	8	WD	08	42.5	.018	.027	.025							
	6	MM	0846	0849				.510						
	6	SKIDD	0846	0849					.650					
	6	DBV_1	0847	0849						2.[illegible]1				
	6	MILES	A B O	R TED							--			
	6	DBV_2	0848	08[illegible]0										2.2[illegible]
	9	WD	08	49	.011	.019	.01[illegible]							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
[illegible]	4	TANKER	0850	0904										
	10	WD	08	55	.045	.07[illegible]	.060							
	7	MM	0902	0905				.440						
	7	SKIDD	0902	0905					.600					
	7	DBV_1	0903	0906						2.46				
	7	MILES	A B O	R T E	D						--			
	7	DBV_2	0904	0906										2.38**
	[illegible]	A/C	0908	0913								340	7	
	11	WD	09	10	.01[illegible]	.024	.027							
	8	MM	0914	0917				.520						
	8	SKIDD	0914	0917					.630					
	8	DBV_1	0915	0918						2.26				
	8	MILES	0916	0918							.464			
	8	DBV_2	0916	0919										2.20**
	12	WD	09	19	.015	.0[illegible]	.01[illegible]							
	5	A.-B.	0918	0932										
	13	WD	09	27	.047	.067	.06[illegible]							
	9	MM	0930	0933				.420						
	9	SKIDD	0930	0933					.580					
	9	DBV_1	0932	0935						2.51				
	9	MILES	0932	0934							.438			
	9	DBV_2	0933	0935										2.44**
	.34	A/C	0936	0940								005	10	
	14	WD	09	38	.014	.026	.032							
	10	MM	0941	0943				.490						
	10	SKIDD	0941	0943					.620					
	10	DBV_1	094[illegible]	0945						[illegible].24				
	10	MILES	0943	0944							.480			
	10	DBV	0943	0946										2.19**
	15	WD	09	45	.009	.018	.014							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/25	6	TANKER	0957	1013										
	16	WD	10	06	.037	.052	.059							
	11	MM	1010	1013	LEFT OF ℄			.420						
	11	SKIDD	1010	[illegible]	RIGHT OF ℄				.600					
	11	DBV_1	1011	1014	RIGHT OF ℄					2.49				
	11	MILES	1012	1014	LEFT OF ℄						.435			
	11	DBV_2	1012	1015	[illegible] ℄									2.12
	.32	A/C	1016	1020								010	7	
	17	WD	10	18	.009	.024	.019							
	12	MM	1021	1024				.490						
	12	SKIDD	1021	1024					.610					
	12	DBV_1	1022	1025						2.35				
	12	MILES	1023	1025							.463			
	12	DBV_2	1023	1026										2.05
	18	WD	10	26	.008	.016	.019							
	7	TANKER	1025	1040										
	19	WD	10	35.6	.048	.057	.061							
	13	MM	1038	1041				---						
	13	SKIDD	1038	1041					.570					
	13	DBV_1	1039	1042						2.56				
	13	MILES	1040	1042							.436			
	13	DBV_2	1040	1043										2.31
	.35	A/C	1044	1048								355	5	
	20	WD	10	45.6	.01[illegible]	.021	.024							
	14	MM	1049	1052				.470						
	14	SKIDD	1049	1052					.580					
	14	DBV_1	1050	1053						2.45				
	14	MILES	1051	1052							.471			
	14	DBV_2	1051	1054										2.07
	21	WD	10	[illegible]	.011	.015	.01[illegible]							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 197[illegible]	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/[illegible]	[illegible]	TANKER	1224	1240										
	22	WD	12	33.5	.040	.060	.062							
	15	MM	1238	1240	RIGHT	OF ℄		.320						
	15	SKIDD	1238	1240	LEFT	OF ℄			.530					
	15	DBV_1	1239	1242	RIGHT	OF ℄				2.60				
	15	MILES	1240	1241	LEFT	OF ℄					.424			
	15	DBV_2	1240	1242	LEFT	OF ℄								2.16
	.23	A/C	1242	1247								265	2	
	23	WD	12	44	.015	.024	.022							
	16	MM	1248	1251				.400						
	16	SKIDD	1248	1251					.560					
	16	DBV_1	1249	1252						2.49				
	16	MILES	1250	1253							.463			
	16	DBV_2	1250	1254										2.02
	24	WD	12	53	.005	.013	.011							
	9	TANKER	1255	1311										
	25	WD	13	05	.051	.067	.070							
	17	MM	1308	1311				.300						
	17	SKIDD	1308	1311					.520					
	17	DBV_1	1309	1312						2.73				
	17	MILES	1310	1312							.409			
	17	DBV_2	1310	1313										2.40
	.33	A/C	1313	1320								095	5.5	
	26	WD	13	15	.017	.018	.022							
	18	MM	1321	1324				.410						
	18	SKIDD	1321	1324					.550					
	18	DBV_1	1322	1325						2.39				
	18	MILES	1323	1324							.457			
	18	DBV_2	1323	1326										2.07
	2[illegible]	WD	13	25	.007	.004	.007							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 197[illegible]	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/25	10	TANKER	1325	1340										
	28	WD	13	34	.04[illegible]	.060	.059							
	19	MM	1338	1341				.310						
	19	SKIDD	1338	1341					.510					
	19	DBV_1	1339	1342						2.51				
	19	MILES	1340	1342							.400			
	19	DBV_2	134[illegible]	1343										2.44
	.27	A/C	1344	1348								175	3	
	29	WD	13	46	.012	.015	.016							
	20	MM	1349	1352				.400						
	20	SKIDD	1349	1352					.540					
	20	DBV_1	1350	1353						2.26				
	20	MILES	1351	1353							.441			
	2[illegible]	DBV_2	1351	1354										2.19
	30	WD	13	54	.00[illegible]	.007	.[illegible]							
	11	TANKER	135[illegible]	140[illegible]										
	31	WD	1[illegible]	02.6	.035	.045	.050							
	21	MM	1406	1409				.320						
	21	SKIDD	1406	1409					.520					
	21	DBV_1	1407	1410						2.42				
	21	MILES	1408	1410							.419			
	21	DBV_2	1408	1411										2.32
	.28	A/C	1412	1418								050	4	
	32	WD	141	4.6	.006	.012	.012							
	22	MM	1419	1422				.440						
	22	SKIDD	1419	1422					.590					
	22	DBV_1	1420	1423						2.17				
	22	MILES	1421	1423							.483			
	22	DBV_2	1422	1424										1.94
	33	WD	14	25	.010	.012	.006							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 6[illegible] TO STOP.
4. MILES TRAILER [illegible] ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XI. [illegible]

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: L-1011 RUNWAY SLOPE= -.00[illegible] RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/25	12	TANKER	14[illegible]	1440										
	34	WD	14	34	.04[illegible]	.057	.050							
	23	MM	1437	1440	LEFT	SIDE OF	℄	.310						
	23	SKIDD	14[illegible]7	1440	RIGHT	SIDE OF	℄		.530					
	23	DBV1	1439	1442						2.47				
	23	MILES	1440	1442							.406			
	23	DBV2	1440	1443										2.38
	.25.1	A/C	1443	1448								120	3.5	
	35	WD	14	45	.016	.020	.019							
	24	MM	144[illegible]	1451				.410						
	24	SKIDD	14[illegible]4	1451					.570					
	24	DBV1	14[illegible]	[illegible]						2.24				
	24	MILES	[illegible]	1452							.459			
	24	DBV2	1450	1453										2.17
	36	WD	14	53	.011	.016	.011							
	1[illegible]	TANKER	145[illegible]	1507										
	37	WD	1[illegible]	[illegible]	.04[illegible]	.027	[illegible]							
	[illegible]	MM	1505	1508				.[illegible]						
	25	SKIDD	150[illegible]	1508					[illegible]					
	[illegible]	DBV1	1506	1509						2.5[illegible]				
	5	MILES	1507	1509							.[illegible]02			
	25	DBV2	1507	1510										2.40
	.41	A/C	1510	1515								150	4	
	38	WD	15	12	.017	.018	.021							
	26	MM	1516	1518				.390						
	26	SKIDD	1516	1518					.570					
	26	DBV1	1517	1519						2.36				
	26	MILES	1518	151[illegible]							.441			
	26	DBV2	1518	1520										2.23
	39	WD	15	20	.009	.012	.012							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT [illegible] MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER [illegible] AVERAGE FROM 65 TO 0 KNOTS.

TABLE XII.

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: B-737 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH			MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
					LEFT	CENTER	RIGHT							
10/17	1	TANKER	0758	0816										
	1	WD	08	[illegible]	.044	.065	.080							
	1	MM	0814	0817	LEFT	SIDE		.424						
	1	SKIDD	0814	0817	RIGHT	SIDE			-					
	1	DBV	0815	0818	LEFT	SIDE				2.26				
	1	MILES	0816	0819	RIGHT	SIDE					.412			
	.010	A/C	0820	0821								130	1	
	2	WD	08	[illegible]	.021	.021	.022							
	2	MM	0822	-				.436						
	2	SKIDD	0822	-					-					
	2	DBV	0823	-						2.16				
	2	MILES	0824	-							.430			
	3	WD	08	26	.017	.017	.019							
	2	TANKER	0832	-										
	4	WD	[illegible]	43	.061	.067	.072							
	3	MM	0846	0849				.284						
	3	SKIDD	0846	0849					-					
	3	DBV	0848	0850						2.46				
	3	MILES	0849	0851							.389			
	.013	A/C	0851	0852								120	3	
	5	WD	08	53	.024	.026	.030							
	4	MM	0854	0856				.374						
	4	SKIDD	0854	0856					-					
	4	DBV	0855	0858						2.43				
	4	MILES	0856	0859							.393			
	6	WD	08	58	.021	.026	.021							

NOTE: 1. MU-METER [illegible] AT 40 MPH.
2. SKIDDOMETER [illegible] 40 MPH.
3. DBV SDR [illegible] TO STOP.
4. MILES [illegible] ARE AVERAGE [illegible] M 85 TO 0 KNOTS.

TABLE XII. (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M.   RUNWAY: 03   SURFACE: CONCRETE   MEAN ELEV. 3666 FEET
AIRCRAFT: B-737   RUNWAY SLOPE= -.0034   RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEH-ICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CEN-TER	RIGHT	MU-METER	SKIDD-OMETER	DBV SDR #1	MILES TRAI-LER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/17	3	TANKER	0932	0947										
	7	WD	09	4[illegible]	.070	.076	.074							
	5	MM	0945	0948				.252						
	5	SKIDD	0945	0948					.526					
	5	DBV	0947	0949						2.51				
	5	MILES	0948	0950							.359			
	.019	A/C	0951	0952								150	9	
	8	WD	09	[illegible]3	.026	.020	.036							
	6	MM	0954	0956				.306						
	6	SKIDD	0954	0956					.598					
	6	DBV	0955	0958						2.51				
	6	MILES	0957	0958							.374			
	9	WD	09	59	.01[illegible]	.018	.025							
	4	TANKER	0959	1014										
	10	WD	1[illegible]	08.5	.[illegible]	.080	.0[illegible]							
	7	MM	1014	1016				.286						
	7	SKIDD	1014	1016					.552					
	7	DBV	1015	1017						2.57				
	7	MILES	1016	1018							.368			
	.016	A/C	1019	1020								135	11	
	11	WD	10	21	.01[illegible]	.016	.021							
	8	MM	1024	1027				.346						
	8	SKIDD	1024	1027					.642					
	8	DBV	1025	1028						2.46				
	8	MILES	1027	1029							.407			
	1[illegible]	WD	10	29	.013	.01[illegible]	.018							

NOTE: 1.MU-METER VALUES AT 40 MPH.
2.SKID[illegible]
3.DBV [illegible]
4.MILE[illegible]
FROM 8[illegible]

TABLE XIII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: B-737 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/17	5	TANKER	1029	1045										
	13	WD	10	39	.057	.072	.077							
	9	MM	1044	1046				.304						
	9	SKIDD	1044	1046					.558					
	9	DBV	1045	1047						2.60				
	9	MILES	1046	1048							.366			
	.011	A/C	1049	1050								160	9	
	14	WD	10	52	.016	.020	.023							
	10	MM	1052	1054				.342						
	10	SKIDD	1052	1054					.596					
	10	DBV	1053	1055						2.44				
	10	MILES	1054	1056							.373			
	15	WD	10	56.5	.011	.015	.019							
	6	TANKER	1056	1113										
	16	WD	11	06	.061	.072	.071							
	11	MM	1111	1114				.296						
	11	SKIDD	1111	1114					.540					
	11	DBV	1112	1115						2.54				
	11	MILES	1113	1115							.351			
	.023	A/C	1117	[illegible]								145	5	
	17	WD	11	19	.013	[illegible]	.022							
	12	MM	1121	1124				.366						
	12	SKIDD	1121	1124					.608					
	12	DBV	1122	1125						2.42				
	12	MILES	1123	1125							.375			
	18	WD	11	27	.011	.014	.017							

NOTE: 1. MU-METER VALUES AT 40 MPH
2. SKIDDOMETER [illegible] 40 MPH.
3. DBV SDR FROM [illegible] TO [illegible].
4. MILES TRAILER [illegible] AVERAGE FROM 85 TO 0 KNOTS.

TABLE XIII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: B-737 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/17	7	TANKER	1127	1141										
	19	WD	11	36.5	.055	.075	.075							
	13	MM	1140	1143				.224						
	13	SKIDD	1140	1143					.544					
	13	DBV	1141	1144						2.59				
	13	MILES	1142	1144							.312			
	.014	A/C	1147	1148								185	9	
	20	WD	11	49	.012	.019	.017							
	14	MM	1150	1152				.326						
	14	SKIDD	1150	1152					.614					
	14	DBV	1151	1154						2.46				
	14	MILES	1152	1154							.389			
	21	WD	11	53	.012	.009	.017							
	8	TANKER	1153	1208										
	22	WD	12	04	.062	.071	.076							
	15	MM	1207	1209				.216						
	15	SKIDD	1207	1209					.534					
	15	DBV	1208	1210						2.64				
	15	MILES	1209	1211							.337			
	.018	A/C	1213	1214								135	6	
	23	WD	12	15	.014	.021	.022							
	16	MM	1215	1217				.322						
	16	SKIDD	1215	1217					.578					
	16	DBV	1216	1219						2.44				
	16	MILES	1217	1219							.389			
	24	WD	12	20	.014	.014	.020							

NOTE: 1 MU-METER VALUES AT [illegible] MPH.
2. SKIDDOMETER [illegible] 40 MPH.
3. DBV S[illegible] FROM [illegible] 10 [illegible].
4 MILES TRAILER [illegible] AVERAGE
[illegible] 65 TO 0 [illegible].

TABLE XIII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: B-737 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/17	9	TANKER	1220	1235										
	25	WD	12	30.6	.050	.070	.076							
	17	MM	1234	1236				.278						
	17	SKIDD	1234	1236					.524					
	17	DBV	1235	1237						2.65				
	17	MILES	1236	1238							.372			
	.012	A/C	1241	1242								175	7	
	26	WD	12	43	.011	.018	.022							
	18	MM	1243	1246				.324						
	18	SKIDD	1243	1246					.580					
	1[illegible]	DBV	1244	1247						2.46				
	18	MILES	1245	1247							.397			
	27	WD	12	47.6	.008	.016	.016							
	11	TANKER	1448	1502										
	29	WD	14	56	.065	.081	.077							
	20	MM	1501	1504				.254						
	20	SKIDD	1501	1504					.520					
	20	DBV	1502	1504						2.63				
	20	MILES	1503	1505							.351			
	.017.1	A/C	1508	1509								140	5	
	30	WD	15	10	.011	.017	.021							
	21	MM	1510	1513				.328						
	21	SKIDD	1510	1513					.582					
	21	DBV	1511	1514						2.44				
	21	MILES	1512	1514							.389			
	31	WD	15	15	.009	.015	.014							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XIII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: B-737 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEH-ICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CEN-TER	RIGHT	MU-METER	SKIDD-OMETER	DBV SDR #1	MILES TRAI-LER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/17	12	TANKER	1515	1529										
	32	WD	15	24	.062	.075	.077							
	22	MM	1528	15:31				.264						
	22	SKIDD	1528	1531					.466					
	22	DBV	1529	1532						2.54				
	22	MILES	1530	1532							.352			
	.025	A/C	1534	1535								155	11	
	33	WD	15	36	.017	.021	.025							
	23	MM	1537	-				.322						
	23	SKIDD	1537	-					.530					
	23	DBV	1538	-						2.46				
	23	MILES	1539	-							.380			
	34	WD	15	41	.014	.016	.017							
	13	TANKER	1541	1556										
	35	WD	15	51	.061	.080	.080							
	24	MM	1554	1557				.276						
	24	SKIDD	1554	1557					.448					
	24	DBV	1556	1558						2.63				
	24	MILES	1557	1559							.343			
	.020	A/C	1600	1601								165	9	
	36	WD	16	02	.015	.019	.023							
	25	MM	1603	1605				.336						
	25	SKIDD	1603	1605					.522					
	25	DBV	1604	1606						2.59				
	25	MILES	1605	1606							.377			
	37	WD	16	06	.014	.016	.018							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XIII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: B-737 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEH-ICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CEN-TER	RIGHT	MU-METER	SKIDD-OMETER	DBV SDR #1	MILES TRAI-LER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/17	14	TANKER	1608	1620										
	38	WD	16	17	.060	.074	.075							
	26	MM	1619	1622				.280						
	26	SKIDD	1619	1622					.470					
	26	DBV	1621	1623						2.56				
	26	MILES	1622	1623							.347			
	.015	A/C	1625	1626								125	8	
	39	WD	16	27	.018	.021	.020							
	27	MM	1628	1630				.326						
	27	SKIDD	1628	1630					.536					
	27	DBV	1629	1632						2.49				
	27	MILES	1630	1632							.409			
	40	WD	16	32	.013	.015	.020							
10/18	1	TANKER	1019	-										
	1	WD	10	28	.057	.076	.072							
	1	MM	1035	1037				-*						
	1	SKIDD	1035	1037					-*					
	1	DBV	1037	1038						-*				
	1	MILES	1037	1038							-*			
	.030	A/C	1038	1039								345	2	
	2	WD	10	41	.013	.013	.021							
	2	MM	1044	1946				.364						
	2	SKIDD	1044	1046					.602					
	2	DBV	1045	1047						2.33				
	2	MILES	1046	1047							.385			
	3	WD	10	47	.010	.010	.019							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

*A/C too close. Ground Vehicle Data Not Representative

TABLE XIII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M.   RUNWAY: 03   SURFACE: CONCRETE   MEAN ELEV. 3666 FEET
AIRCRAFT: B-737   RUNWAY SLOPE= -.0034   RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/18	2	TANKER	1048	1103										
	4	WD	10	56	.055	.074	.069							
	3	MM	1102	1105				.306						
	3	SKIDD	1102	1105					.494					
	3	DBV	1103	1106						2.53				
	3	MILES	1104	1106							.367			
	.035	A/C	1106	No Stop								090	2	
	5	WD	11	08	.016	.019	.017							
	4	MM	1109	1111				.330						
	4	SKIDD	1109	1111					.552					
	4	DBV	1110	1112						2.44				
	4	MILES	1111	1112							.391			
	6	WD	11	14	.012	.014	.020							
	3	TANKER	1120	-										
	7	WD	11	29	.039	.061	.060							
	5	MM	1134	1137				.296						
	5	SKIDD	1134	1137					.496					
	5	DBV	1135	1138						2.54				
	5	MILES	1136	1138							.386			
	.035.1	A/C	1139	No Stop								300	1	
	8	WD	11	40	.012	.016	.019							
	6	MM	1140	1143				.370						
	6	SKIDD	1140	1143					.548					
	6	DBV	1142	1144						2.46				
	6	MILES	1143	1145							.381			
	9	WD	11	44	.010	.011	.021							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XIII (cont'd)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: B-737 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH LEFT	CENTER	RIGHT	MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
10/18	4	TANKER	1146	-										
	10	WD	11	55	.052	.070	.071							
	7	MM	1200	1203				.304						
	7	SKIDD	1200	1203					.492					
	7	DBV	1202	1204						2.67				
	7	MILES	1203	1204							.392			
	.831	A/C	1205	No Stop								120	5	
	11	WD	12	06	.014	.018	.021							
	8	MM	1207	1209				.356						
	8	SKIDD	1207	1209					.530					
	8	DBV	1208	1210						2.43				
	8	MILES	1209	1211							.411			
	12	WD	12	11	.012	.013	.013							
	5	TANKER	1213	1228										
	13	WD	12	22	.052	.068	.070							
	9	MM	1227	1229				.266						
	9	SKIDD	1227	1229					.516					
	9	DBV	1228	1231						2.61				
	9	MILES	1229	1231							.371			
	.033	A/C	1232	No Stop								075	5	
	14	WD	12	32.5	.011	.014	.017							
	10	MM	1235	1238				.346						
	10	SKIDD	1235	1238					.548					
	10	DBV	1236	1239						2.40				
	10	MILES	1237	1239							.413			
	15	WD	12	38	.010	.010	.016							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XIII (concl.)

CONCORDE SPECIAL CONDITIONS - LANDING REQUIREMENT EVALUATION TESTS

AIRPORT: ROSWELL, N.M. RUNWAY: 03 SURFACE: CONCRETE MEAN ELEV. 3666 FEET
AIRCRAFT: B-737 RUNWAY SLOPE= -.0034 RUNWAY CONDITION - WET

SUMMARY OF GROUND VEHICLE DATA

DATE 1973	RUN	VEHICLE	TIME ON	TIME OFF	AVG. WATER DEPTH			MU-METER	SKIDDOMETER	DBV SDR #1	MILES TRAILER	WIND DIR. DEG.	WIND VEL. KTS.	DBV SDR #2
					LEFT	CENTER	RIGHT							
10 18	0	TANKER	1239	1253										
	10	WD	12	48	.057	.068	.071							
	11	MM	1253	1256				.304						
	11	SKIDD	1253	1256					.494					
	11	DBV	1254	1257						2.71				
	11	MILES	1255	1257							.344			
	.036	A/C	1258	No Stop								090	5	
	17	WD	12	58.5	.013	.016	.020							
	12	MM	1259	1302				.352						
	12	SKIDD	1259	1302					.534					
	12	DBV	1300	1303						2.53				
	12	MILES	1301	1303							.371			
	1[illegible]	WD	13	02	.010	.016	.015							

NOTE: 1. MU-METER VALUES AT 40 MPH.
2. SKIDDOMETER VALUES AT 40 MPH.
3. DBV SDR FROM 60 MPH. TO STOP.
4. MILES TRAILER VALUES ARE AVERAGE FROM 85 TO 0 KNOTS.

TABLE XIV
L-1011 CALCULATION OF μ_B FOR 2 ENGINE REVERSE
THRUST RUNS USING TEST (RMS) REVERSE THRUST

Runway Condition - Wet

○	QUANTITY	UNITS	1	2	3	4	5	6	7	8
1	Run No.		.06	12.2	.14	.30	.31	.32	.36	.38
2	σ		.8916	.8817	.9040	.9078	.8310	.8801	.8825	.8979
3	GW x 10^{-3}	LB	345.8	330.4	362.6	356.0	308.8	309.3	334.1	338.8
4	V_{BG}	KTAS	147.7	139.0	148.3	154.8	151.8	146.9	148.6	144.1
5	$W V_{BG}^2 \times (10)^{-9}$	$LBKT^2$	7.544	6.384	7.975	8.531	7.116	6.675	7.378	7.035
6	V_{BA}	KTAS	149.5	140.3	149.1	157.7	147.8	153.7	151.3	147.4
7	V_{MAX} REV (Chart)	KTAS	119.5	110.8	120.8	126.8	110.0	119.7	120.2	116.5
8	FN (RMS) Test	LB	-13209	-10875	-8269	-14752	-12057	-13411	-14421	-14154
9	FN/W = 8 / 3		-.0382	-.0329	-.0228	-.0414	-.0390	-.0433	.0431	-.0418
10	Ø		-.0034			-.0034				
11	DRAG		27159	23559	27280	30646	24642	28223	27423	26124
12	D/W = 11 / 3		.0755	.0713	.0752	.0861	.0798	.0912	.0831	.0771
13	S Test		2096	2025	2437	4738	4567	4175	4590	3877
14	.0442697 x $④^2$		965.7	855.3	973.6	1060.8	1020.1	955.3	977.6	919.2
15	14 / 13		.4607	.4224	.3995	.2239	.2234	.2288	.2129	.2371
16	LIFT		-21072	-18278	-21165	-23777	-19118	-21897	-21276	-20265
17	16 / 13		-.0609	-.0553	-.0584	-.0668	-.0619	-.0708	-.0637	-0598
18	1 - 17		1.0609	1.0553	1.0584	1.0668	1.0619	1.0708	1.0637	1.0598
19										
20	9 - 10 - 12 + 15		.3474	.3216	.3049	.0998	.108	.0977	.0911	.1216
21	20 / 18 = μ_B Wet		.3274	.3047	.2880	.0935	.1017	.0912	.0856	.1147
22										
23	S DRY (No Wind)		2157	2060	2463	2550	2190	2060	2250	2160
24	S WET (No Wind)					4898	4344	4530	4745	3990
25	SDR					1.92	1.98	2.20	2.11	1.85

$$\mu_B = \frac{\dfrac{(T/W) - Ø - (D/W) + (1.6878)^2\, V_{BG}^2}{2gS_{Test}}}{1 - (L/W)}$$

μ_B (DRY)	.291	.310	.319	.3055	.3120
$\mu_{B_{DRY}}/\mu_{B_{WET}}$	3.11	3.048	3.497	3.57	2.72

TABLE XV
L-1011 CALCULATED STOP DISTANCE FOR 2 ENGINE
REVFRSE THRUST TEST POINTS USING AVERAGE REVERSE THRUST

O	QUANTITY	UNITS	1	2	3	5	6	7	8	9
1	Run No.		.06	.12.2	.14	.30	.31	.32	.36	.38
2	GW $\times (10)^{-3}$	LB	345.8	330.4	362.6	356	308.8	309.[illegible]	334.1	338.8
3	σ		.8916	.8817	.9040	.9078	.8310	.8801	.8825	.8979
4	V_{BGS}	KTAS	147.7	139	148.3	154.8	151.8	146.9	148.6	144.1
5	$WV_{BG}^2 \times (10)^{-9}$	$LBKT^2$	7.544	6.384	7.975	8.531	7.116	6.675	7.378	7.035
6	$.0442697 \times 5 \times (10)^{-8}$	-	3.339	2.826	3.530	3.777	3.150	2.955	3.266	3.114
7	V_{BA}	KTAS	149.[illegible]	140.3	149.1	157.7	147.8	15[illegible].7	151.3	146.4
8	V_{MAX} REV	KTAS	119.8	110.8	120.8	126.8	115	119.7	120.2	116.5
9	FN @ V_{MAX} REV	LB	-12900	-11900	-13000	-13680	-12400	-12900	-12960	-12540
10	DRAG	LB	27159	23559	27280	30646	24642	28223	27423	26124
11	SDR		-	-	-	1.92	1.98	2.20	2.11	1.85
12	μ_B (From Charts)		.305	.325	.2975	.097	.0993	.0869	.0897	.1126
13	LIFT	LB	-21072	-18278	-21165	-23777	-19118	-21897	-21276	-20268
14	$12 \times (2 - 13)$	LB	111896	113320	114170	36838	32562	28781	31877	40431
15	$2 \times -.0034$	LB	-1176	-1123	-1233	-1210	-1050	-1052	-1136	-1152
16	$9 - 10 - 14 - 15$	LB	-150779	-147656	-153217	-79954	-68852	-68852	-71124	-77943
17	$S = 6 / 16$	FT.	2214	1914	2304	4724	4292	4292	4592	3995
18										
19	Test Distance	FT	2096	2024	2437	4738	4567	4175	4590	3877

TABLE XVI

737 MAIN GEAR TIRE MOMENTS OF INERTIA

Disc weight = 8.343 lbs
R = 9 in
L = 283.75 - 41.0 = 242.75 in
τ = 3.62 sec

$$J_o = \frac{\tau^2 W R^2}{4 \pi^2 L} = 0.92407 \text{ in-lbf-sec}^2$$

<u>Simulated worn tire</u>

W = 210 lbs
W_o = 8.343 lbs
R = 9 in
L = 283.75 - 40.125 = 243.625 in
τ = 6.9 sec

$$J + J_o = \frac{\tau^2 (W_o + W) R^2}{4 \pi^2 L} = 87.54962 \text{ in-lbf-sec}^2$$

$$\underline{\underline{J = 86.62285 \text{ in-lbf-sec}^2}}$$

<u>Service worn tire</u>

W = 195 lbs
W_o = 8.343 lbs
R = 9 in
L = 283.75 - 40.25 = 243.50 in
τ = 6.8 sec
$J + J_o$ = 79.22703 in-lbf-sec^2

$$\underline{\underline{J = 78.30296 \text{ in-lbf-sec}^2}}$$

ΔJ = 8.31989 in-lbf-sec^2
%ΔJ = 10.6%

TABLE XVII
B-737 AIRCRAFT TIRE TEST PROGRAM
FRICTION DATA

		Test Surface #1 BRAKE CYCLE @ STA 55 + 0			Test Surface #2 BRAKE CYCLE @ STA 85 + 0		
DATE & RUN NO.	TEST TIRE	V_G, KNOTS	μ MAX	μ SKID	V_G, KNOTS	μ MAX	μ SKID
4-4-74-1	SIM.	-	-	-			
4-4-74-2	WORN	-	-	-			
4-5-74-1		-	-	-	105.9	.126	.035
4-9-74-1		105	.130	.069	102	.110	.034
4-10-74-2		80	.179	.071	76	.194	.047
4-10-74-2		64	.193	.070/.0[illegible]1	60	.216	.060/.072
4-10-74-3		40.8	.371	.163/.153	39.2	.391	.126
4-10-74-4		15.9	.652	.294	14.4	.459	.265/.239
4-10-74-5		7.4	.718	.415/.396	5.4	.687	.350
4-11-74-1	SERVICE						
4-12-74-2	WORN	82.9	.261	.103	103.5	.150	.059
4-12-74-3		111.0	.333	.064/.087	78.7	.265	.066/.083
4-12-74-4		65.4	.417	.161/.142	107.0	DAMP/.348	.060/.032
4-12-74-5		42.0	.577	.206/.218	57.8	.320	.095
4-12-74-6		25.6	.651	0.280	37.9	.473	.169/.162
4-12-74-7		6	.77	-	23.7	.586	.262
4-15-74-1		94.7	.246	.076/.078	6	.74	.38
					90.5	.137	.072/.066
FAIRED CURVE VALUES	SIM. WORN	100	.135	.065			
		80	.17	.075			
		60	.23	.095			
		40	.38	.14			
		20	.60	.265			
		5	.75	.45			
	SERVICE WORN	100	.17	.08			
		80	.30	.108			
		60	.43	.16			
		40	.56	.23			
		20	.69	.315			
		5	.78	-			

TABLE XVIII
SUMMARY
GROUND VEHICLE DATA ADJUSTED TO AIRCRAFT LANDING TIME

DATE AND A/C RUN	MU-METER AVG. VALUE AT A/C TIME 40 mph.	SKIDD-OMETER AVG. MU AT A/C TIME 40 MPH.	MILES TRAILER AVG. MU OVER 85 TO ZERO KT. RANGE	MILES TRAILER BDRY/BWET	DBV SDR	DBV 1/SDR	A/C SDR	A/C 1/SDR	AVG. WATER DEPTH INCHES A/C	NO. OF ENGINES IN REVERSE	REMARKS
10/17/73	B-737		.								
.010	.431	-	.419	-	2.21	.452	1.82	.549	.023	1	Treaded tire on Skiddometer
.013	.329	-	.390	2.09	2.45	.408	2.34	.427	.030	0	For all runs on 17 & 18 Oct.
.019	.282	.568	.361	2.20	2.51	.398	2.40	.417	.032	0	1973.
.016	.310	.588	.377	-	2.53	.395	2.17	.461	.021	1	
.011	.323	.578	.367	-	2.54	.394	2.04	.490	.024	1	
.023	.331	.574	.359	-	2.51	.398	2.19	.457	.023	1	
.014	.295	.588	.347	2.23	2.52	.397	2.43	.411	.019	0	
.018	.272	.557	.360	-	2.53	.395	2.34	.427	.022	1	
.012	.309	.562	.384	-	2.54	.394	2.31	.432	.020	1	
.017.1	.303	.561	.370	-	2.52	.397	2.48	.403	.020	1	
.025	.296	.501	.363	-	2.50	.400	2.32	.431	.026	1	
.020	[illegible]	.489	.353	2.34	2.61	.382	2.63	.380	.022	0	
.015	05	.507	.369	2.34	2.53	.395	2.99	.334	.024	0	
10.18/73	B-737								B-737		
.030	-	.521	-	-	-	-	2.73	.366	.020	0	DBV & Miles Abort at Marker "B"
.035	.316	.519	.372	-	2.50	.400			.019	0	Main A/C Wheels Lock-Up.
.035.1	.347	.532	.384	-	2.50	.400			.017	0	
.031	.337	.516	.399	-	2.55	.392			.018	0	
.033	.313	.535	.387	-	2.52	.397			.014	0	
.036	.340	.524	.356	-	2.60	.384			.016	0	
10/24/73	L-1011								L-1011		
[illegible]	.527	.773	.372	2.28	2.23	.448	2.02	.495	.026	0	Treaded Tire on Skiddometer
.20	.475	.754	.349	2.35	2.43	.411	2.38	.420	.024	0	For all Runs on 24 Oct. 1973.
.36	.404	.692	.333	-	2.55	.392	2.07	.483	.024	2	
.21	.397	.700	.337	2.37	2.50	.400	2.39	.418	.018	0	
.22	.380	.658	.338	2.34	2.57	.389	2.66	.376	.022	0	
.26	.372	.644	.322	2.44	2.59	.386	2.76	.362	.025	0	
.37	.441	.652	.411	1.98	2.47	.405	2.59	.366	.016	0	
.24	.393	.643	.410	1.99	2.48	.403	2.28	.438	.016	0	
.31	.414	.619	.402	-	2.56	.391	2.00	.500	.017	2	
.25	.436	.613	.411	2.10	2.61	.383	2.57	.389	.017	0	
10/25/73	L-1011								- L-1011		
.30	.507	.670	.429	-	2.38	.420	1.88	.532	.024	2	Smooth Tire on Skiddometer
.38	.477	.632	-	-	2.48	.403	1.86	.537	.025	2	For All Runs on 25 Oct. 1973.
.39	.470	.611	-	-	2.40	.417			.024	1	
.34	.448	.596	.451	-	2.44	.410			.024	1	
.32	.448	.604	.443	-	2.44	.410	2.22	.450	.020	2	
.35	-	.574	.446	-	2.52	.397			.022	1	
.23	.343	.538	.428	1.98	2.58	.387	2.49	.401	.020	0	
.33	.329	.528	.416	-	2.66	.376	2.87	.348	.023	2	
.27	.347	.522	.411	1.98	2.43	.411	2.64	.378	.017	0	
.28	.361	.544	.434	2.00	2.35	.425	2.37	.422	.012	0	
.25.1	.351	.546	.417	2.07	2.41	.415	2.51	.398	.021	0	
.41	.335	.549	.409	2.05	2.47	.405	2.45	.408	.021	0	

TABLE XIX

SUMMARY OF AIRCRAFT/DBV DATA
OBTAINED AT DATES AND/OR PLACES
OTHER THAN ROSWELL, N.M. DURING
OCTOBER 1973 - L-1011 & B-737

Aircraft	Location	Date	A/C SDR	DBV SDR	Source/Remarks
L-1011	Boeing Field	1972	1.43	1.78	LR-25083 & BY Phone From
			1.56	1.84	Lockheed 12/19/73.
			1.53	1.77	Flaps 42
			1.70	1.79	
			1.74	1.67	
B-737	Boeing Field	-	1.45	1.63	Boeing
	Roswell, N.M.	2/73	1.97	2.02	Flaps 40
			2.08	2.11	
			2.03	1.98	

Fixed Values

C_{D_G} = .232 ϕ = -.0034

C_{L_G} = -.180 V_W = 0

TABLE XX

L-1011 LANDING FIELD LENGTH CALCULATIONS

FLAPS 42°, DLC/AGSB OPERATIVE, ANTI-SKID OPERATIVE

hp = 3669', T_{AM} = 7.8°C (ROSWELL N.M. STANDARD DAY)

	QUANTITY	UNITS	1	2	3	4	5	6	7
1	Flight Path γ, δ	Deg	3				2		
2	V_{APP}	KT	1.3Vsig				$1.3V_{sig}$ + 10 kt.		
3	GW x 10^{-3}	LB	280	320	360		280	320	360
4	No. of Eng. in Rev.	-	2				2		
5	V_{sig}	KEAS	103.1	110.2	116.4		103.1	110.2	116.4
6	σ	-	.8967				.8967		
7	V_{APP}	KTAS	141.5	151.3	159.8		151.5	161.3	169.8
8									
9	ta	SEC	5.49	6.12	6.9		8.98	9.10	9.21
10	V_{TD}/V_{APP}		.984	.9725	.958		.956	.938	.9135
11	Sa	FT	1301	1541	1822		2246	2401	2525
12									
13	Δt_{FB}	SEC	2				2		
14	V_{FB}/V_{TD}		.966				.966		
15	S_T	FT	462	488	508		480	502	515
16	$S_A + S_T$	FT	1763	2029	2330		2726	2903	3040
17									
18	V_{BG} = 7 x (10 x 14)	KTGS	134.5	142.1	147.9		139.9	146.1	149.8
19	WV^2_{BG} x 10^{-9} = 3 x V_{δ}^2	$LBKT^2$	5.06	6.46	7.87		5.48	6.83	8.08
20	-.0442697 x 19 x 10^{-5}	T. LB.	-2.24	-2.86	-3.48		-2.42	-3.02	-3.58
21	FN_{RMS}(Fig. 10)	LB.	-10900	-11980	-12860		-11400	-12320	-13020
22	DRAG	LB.	21992	24566	26604		23817	25974	27313
23	μ_B	-	.365	.324	.299		.350	.316	.297
24	LIFT	LB.	-17063	-19060	-20641		-18478	-20152	-21191
25	23 x (3 - 24)	LB.	108428	109855	113811		104467	107488	113213
26	3 x (-.0034)	LB.	-952	-1088	-1224		-952	-1088	-1224
27	21 - 22 - 25 - 26	LB.	-140368	-145313	-152051		-138732	-144694	-152322
28	S_B = 20 / 27	FT.	1596	1968	2289		1744	2087	2350
29						1.15 x 28	2006	2400	2702
30									
31	S = 16 + 28	FT.	3359	3997	4619		4732	5303	5742
32			REF DRY					SCHED. DRY	
33	V_{MAX} REV	KT.	102.5	111.5	119.3		106.6	114.7	120.8

TABLE XX (CONT'D)

	QUANTITY	UNITS	1	2	3	4	5	6	7
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23	μ_B (Factor = 2.35)	-	.1553	.1378	.1272		.1489	.1344	.1264
24	LIFT	LB.	-17063	-19060	-20641		-18478	-20152	-21191
25	23 x(3 - 24)	LB.	46134	46722	48417		44443	45716	48182
26	3 x (-.0034)	LB.	-952	-1088	-1224		-952	-1048	-1224
27	21 - 22 - 25 - 26	LB.	-78074	-82180	-86657		78708	82922	87291
28	S_B = 20 / 27	FT.	2869	3480	4016		3074	3642	4101
29						1.15 28	3535	4188	4716
30									
31	S = 16 + 28	FT.	4632	5509	6346		6261	7091	7756
32				REF WET				SCHED. WET	
33									
34									
35	CONDITION WET	SDR	=2.0	(NO REV THRUST)			SDR = 1.66 (2 Eng. in Rev.)		

Fixed Values
C_{D_G} = .285 ϕ = -.0034
C_{L_G} = .242 V_w = 0

TABLE XXI

LANDING FIELD LENGTH CALCULATIONS - B-737
FLAPS 40° ANTI-SKID OPERATIVE; ONE ENGINE REVERSED
DURING STOP hp = 3669' TAM = 7.8° C (ROSWELL N.M. STD. DAY)

	QUANTITY	UNITS	1	2	3	4	5	6	7	8	9
1	Flight Path	DEG	3					2			
2	V_{APP}	KT	1.3V_{sig}					1.3V_{sig}	+10 kt.		
3	GW x 10 -3	LB	70	80	90	100		70	80	90	100
4	No. of Eng. in Rev.	-	1					1			
5	V_{sig}	KEAS	82.3	88.3	94.3	100		82.3	88.3	94.3	100
6	σ	-	.8967								
7	V_{APP}	KTAS	113	121.2	129.4	137.3		123	131.2	139.4	147.3
8											
9	ta	SEC	4.2					7.75			
10	V_{TD}/V_{APP}	-	1.0					.986			
11	Sa	FT.	801	859	917	973		1597	1704	1811	1913
12											
13	Δt_{FB}	SEC	2.0					2.0			
14	V_{FB}/V_{TD}		.9655					.9655			
15	ST	FT.	375	402	429	455		402	429	456	482
16	S_a + ST	FT.	1176	1261	1346	1428		1999	2133	2267	2395
17											
18	V_B = 7 x 10 x 14	KTAS	109	[illegible]	125	132		117	125	133	140
19	$WV_B^2 \times 10^{-9}$ = 3 x 18^2	LB. KT2	.832	1.095	1.406	1.742		.958	1.250	1.592	1.960
20	-0.0442697 x 19 x 10^{-8}	FT. LB.	-.368	-.485	-.622	-.771		-.424	-.553	-.705	-.868
21	FN(RMS) (From Plot)	LB.	-1350	-1700	-2050	-2360		-1700	-2050	-2410	-2720
22	DRAG	LB	5036	5803	6624	7366		5803	6624	7499	8309
23	μ B		.453	.434	.421	.410		.443	.428	.415	.402
24	LIFT	LB	4276	4927	5624	6272		4927	5624	6367	7055
25	23 x (3 - 24)	LB.	29773	32582	35522	38428		28827	31833	34708	37364
26	3 x -.0034	LB.	-238	-272	-306	-340		-238	-272	-306	-340
27	21 - 22 - 25 - 26	LB.	-35921	-39813	-43890	-47834		-36092	-40235	-44311	-48053
28	SS = 20 / 27	FT.	1024	1218	1417	1612		1175	1374	1591	1806
29							1.15 28	1351	1580	1830	2077
30	S = 16 + 28	FT.	2200	2479	2763	3040		3350	3713	4097	4472
31											
32	CONDITION			REF. DRY DISTANCE					SCHEDULED DRY FIELD LENGTH		

TABLE XXI (CONT'D.)

			1	2	3	4	5	6	7	8	9
1											
2											
3	GW x 10^{-3}	LB	70	80	90	100		70	80	90	100
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18	V_B = 7 x 10 x 14	KTAS	109	117	125	132		117	125	133	140
19	$WV^2{}_{BG}$ x 10^{-9} = 3 x 18^2	$LBFT^2$	.832	1.095	1.406	1.742		.958	1.250	1.592	1.960
20	-0.0442697 x 19 x 10^{-8}	FT.LB	-.368	-.485	-.622	-.771		-.424	-.553	-.705	-.868
21	FN (RMS) (From Plot)	LB	-2240	-2600	-2950	-3260		-2600	-2950	-3310	-3620
22	DRAG	LB	5036	5803	6624	7386		5803	6624	7499	8309
23	μ_B (Factor = 2.32)	-	.195	.187	.181	.177		.191	.184	.179	.173
24	LIFT	LB	4276	4927	5624	6272		4927	5624	6367	7055
25	23 x (3 - 24)	LB	12816	14038	15272	16590		12429	13685	14970	16079
26	3 x -.0034	LB	-238	-272	-306	-340		-238	-272	-306	-340
27	21 - 22 - 25 - 26	LB	-19854	-22169	-24540	-26895		-20594	-22987	-25473	-27668
28	S_s = 20 / 27	FT.	1853	2188	2535	2867		2059	2406	2767	3137
29							1.15 x 28	2368	2767	3182	3607
30	S = 16 + 28	FT.	3029	3449	3881	4295		4367	4900	5449	6002
31											
32	CONDITION		REF. WET DIST.					SCHEDULED WET FIELD LENGTH			

FIXED VALUES
$C_{D_g} = .285$ $\emptyset = -.0034$
$C_{L_g} = .242$ $V_w = 0$
hp = 3669 $T_{AMB} = 7.8°$ C

TABLE XXII
LANDING FIELD LENGTH CALCULATIONS - B-737
FLAPS 40 USING CERTIFICATION DATA FOR
AIR AND TRANSITION DISTANCES AND μ_{BDRY}
FROM ROSWELL N.M. TESTS OCTOBER 1973

	QUANTITY	UNITS	1	2	3	4
1						
2	V_{APP}	KT	$1.3V_{so}$			
3	GW x 10^{-3}	LB	70	80	90	100
4	V_{so}	KEAS	81.2	86.7	92.2	97.8
5	σ		.8967			
6	V_{APP}	KTAS	111.5	119	126.6	134.3
7						
8	ta	SEC	4.03			
9	V_{TO}/V_{APP}		.9648			
10	S_A	FT	745	795	846	897
11						
12						
13	Δt_{FB}	SEC	.54			
14	V_{BA}/V_{APP}		.9526			
15	ST	FT	97	104	111	117
16	$S_a + S_T$	FT	842	899	957	1014
17						
18	V_B = 6 x 14	KTAS	106.2	113.3	120.6	127.9
19	$WV_{BG}^2 \times 10^{-9}$ = 3 x 18^2	LB KT^2	.7894	1.0269	1.309	1.6358
20	-0.0442697 x 19 x 10^{-8}	FT LB	-.3494	-.4546	-.5794	-.724
21	FN(RMS)	LB	1250	1250	1250	1250
22	DRAG	LB	4781	5442	6163	6934
23	μ_{BDRY}		.457	.439	.425	.413
24	LIFT	LB	4087	4652	5270	5928
25	23 x (3 - 24)	LB	30122	33078	36010	38832
26	3 x -.0034	LB	-238	-272	-306	-340
27	21 - 22 - 25 - 26	FT	-33415	-36998	-40619	[illegible]
28	S_8 = 20 / 27		1046	1229	1426	1638
29						
30	S = 16 + 28	FT	1888	2128	2383	2652
31	FAR F.L. = 30 / .6 DRY	FT	3147	3547	[illegible]	[illegible]
32	FAR F.L. WET - 31 x 1.15	FT	3619	4079	[illegible]	[illegible]

Elev. 3669 Ft.
<u>NO WIND</u>

TABLE XXIII
L-1011 COMPUTATION OF REFERENCE LANDING DISTANCE AND SCHEDULED LANDING FIELD LENGTH USING MODIFIED ASSUMPTIONS

C_{D_G} = .232
C_{L_G} = -.180

	QUANTITY	UNITS	1	2	3	4	5	6	7
1	Flight Path	DEG	3				2		
2	V_{REF}	KT.	1.25	V_{sig}			1.25	V_{sig} + 10 KT.	
3	Gross Weight x 10^{-3}	LB.	280	320	360		280	320	360
4	No. of Eng. in Rev.		2				2		
5	V_{sig}	KEAS	103.1	110.2	116.4		103.1	110.2	116.4
6	σ		.8967				.8967		
7	V_{REF}	KTAS	136.1	145.5	153.6		146.1	155.5	163.6
8									
9	ta	SEC	5.2	5.72	6.31		8.90	9.02	9.14
10	V_{TD}/V_{APP}		.990	.980	.970		.959	.952	.932
11	S_A = (7 + 10(7 / (2)) x 9	FT.	1188	1390	1611		2151	2312	2440
12									
13	Δt_{BA}	SEC	2.0				2.0		
14	V/V_{TD}		.966				.966		
15	ST	FT	447	473	494		465	492	508
16	S_A + ST	FT	1635	1863	2105		2616	2804	2948
17									
18	V_{BG} = 7 x 10 x 14	KTGS	130.1	137.7	143.9		135.[illegible]	143.1	147.9
19	$WV_{BG}^2\ (10)^{-9}$ = 3 x $(18)^2$	LB KT^2	4.739	6.067	7.454		5.141	6.553	7.875
20	-.0442697 (10^{-8}) x 19	FT LB	-2.098	-2.686	-3.299		-2.276	-2.90	-3.486
21	$FNAV_g$	LB	-10500	-11570	-12480		-11000	-12080	-12850
22	DRAG	LB	20601	23078	25203		22349	24926	26627
23	μ B	-	.380	.333	.305		.363	.322	.299
24	LIFT	LB	-15983	-17905	-19554		-17340	-19339	-20659
25	23 x (3 - 24)	LB	112473	112522	115764		107934	109267	113817
26	3 x - .0034	LB	-952	-1088	-1224		-952	-1088	-1224
27	21 - 22 - 25 - 26	LB	-142622	-146082	-152223		-1403[illegible]	-145185	-152070
28	S_g = 20 / 27	FT	1471	1838	2167		1622	1997	229[illegible]
29						1.15 28	1865	2296	2636
30									
31	S = 16 + 28 or 29	FT	3106	3701	4272		4481	5100	5584
32									
33	V_{MAX} REV	KTAS	99	108	115.8		103.2	112.3	119.2
34									
35	DRY								

TABLE XXIII (Cont'd.)

L-1011

1									
2									
3									
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17									
18									
19									
20									
21									
22									
23	μ'_B (Factor 2.17)	-	.175[illegible]	.1534	.1405		.167	.148	.133
24	LIFT	LB	-159[illegible]3	-17905	-19554		-17340	-19339	-[illegible]0659
25	23 x (3 - 24)	LB	5182[illegible]	[illegible]1834	53327		49656	50222	52531
26	3 x - .0034	LB	-952	-[illegible]088	-1224		-952	-1088	-1224
27	21 - 22 - 25 - 26	LB	-81975	-[illegible]5394	-89786		-82053	-86140	-90784
28	S_s = 20 / 27	FT	2559	[illegible]45	3674		2774	3367	3839
29						1.15 28	3189	3872	4416
30									
31	S = 16 + 28 or 29	FT	4194	5008	5779		5805	6676	7364
32									
33									
34	WET								
35	DBV SDR = 2.0								

Elev. 3669 Ft.
NO WIND

TABLE XXIV
B-737 COMPUTATION OF REFERENCE LANDING DISTANCE AND SCHEDULED LANDING FIELD LENGTH USING MODIFIED ASSUMPTIONS

$C_{D_G} = .285$
$C_{L_G} = .242$

	QUANTITY	UNITS	1	2	3	4	5	6	7	8	
1	Flight Path	DEG	3			-	2			-	
2	V_{REF}	KT	1.25	V_{sig}			1.25	V_{sig} + 10 KTS.			
3	Gross Weight x 10 -3	LB	70	80	90	100	70	80	90	100	
4	No. Eng. in Rev.		1				1				
5	V_{sig}	KEAS	82.3	88.3	94.3	100	82.3	88.3	94.3	100	
6	ρ		.8967			-	.8967			-	
7	V_{REF}	KTAS	108.6	116.6	124.5	132	113.6	126.6	134.5	142	
8											
9	ta	SEC	4.2				7.75			-	
10	V_{TD}/V_{APP}		1.0				.966				
11	S_A	FT	770	826	882	936	1540	1644	1747	1844	
12											
13	Δt_{BA}	SEC	2.0			-	2.0			-	
14	V_{BA}/V_{TD}		.9655			-	.9655			-	
15	S_T	FT	360	387	413	438	393	420	446	471	
16	$S_A + S_T$	FT	1130	1213	1295	1374	1933	2064	2193	2315	
17											
18	V_{BG} = 7 x 10 x 14	KTAS	104.8	112.6	120.2	127.4	114.5	122.2	129.8	137.1	
19	WV_{BG}^2 (10^{-9}) = 3 x 18 ^{2}	LB KT^2	.7688	1.014	1.30	1.623	.9177	1.1946	1.5163	1.8796	
20	-.0442697 x 19 (10^{-8})	FT LB	-.340	-.443	-.575	-.718	-.406	-.529	-.671	-.832	
21	FN AVG	LB	-1170	-1625	-1850	-2170	-1600	-1940	-2270	-2600	
22	DRAG	LB	4656	5374	6125	6882	5559	6331	7144	7969	
23	μ_B		.462	.440	.425	.413	.446	.430	.417	.405	
24	LIFT	LB	3953	4563	5200	5843	4720	5376	6066	6766	
25	23 x (3 - 24)	LB	30514	33192	36040	38887	29115	32088	35000	37760	
26	3 x -.0034	LB	-238	-272	-306	-340	-238	-272	-306	-340	
27	21 - 22 - 25 - 26	LB	-36102	-39919	43709	-47599	-36036	-40087	-44108	-47989	
28	S_s = 20 / 27	FT	942	1125	1315	1508	1127	1319	1521	1734	
29							1295	1517	1749	1994	1.15 x 28
30											
31	S = 16 + 28 or 29	FT	2072	2338	2610	2882	3228	3581	3942	4309	
32											
33											
34											
35	DRY										

TABLE XXIV (Cont'd.)

B-737

1											
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12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23	ν_B (Factor = 2.25)		.2053	.1955	.1888	.1835	.1982	.1911	.1853	.1800	
24	LIFT	LB	3953	4653	5200	5843	4720	5376	6066	6766	
25	23 x (3 - 24)	LB	13559	14748	16010	17278	12938	14260	15553	16782	
26	3 x -.0034	LB	-238	-272	-306	-340	-238	-272	-306	-340	
27	21 - 22 - 25 - 26	LB	-19147	-21475	-23679	-25990	-19859	-22259	-24661	-27011	
28	Ss = 20 / 27	FT	1775	2090	2428	2762	2044	2376	2721	3080	
29											
30		FT					2351	2733	3129	3542	1.15 x 28
31	S = 16 + 28 or 29	FT	2905	3303	3723	4136	4284	4797	5322	5857	
32											
33											
34	WET										
35	DBV SDR = 2.0										

Appendix II- Concorde Special Conditions Landing Rule

The Concorde Special Conditions applicable to the Landing Requirement are shown below for reference purposes.

F-15 Landing.

In lieu of the requirements in § 25.125 the following apply:

(a) Reference landing distances established under Special Flight Condition F-17, and scheduled landing runway lengths established under Special Flight Condition F-18, must be determined -

(1) For all weights, altitudes, and ambient temperatures within the operational limits established by the applicant for the airplane;

(2) With all engines operating, and with one engine inoperative, in the configuration selected by the applicant for landing in each such condition;

(3) With reference landing approach speeds established in accordance with Special Flight Conditions F-16; and

(4) For smooth hard-surface runways with surface friction characteristics corresponding with established wet/dry stopping distance ratios of 1 to 4 inclusive. At the option of the applicant, data may be presented for additional runway surface types and conditions that can be defined and identified sufficiently to enable operation of the airplane in accordance with applicable limitations, and for which compatibility with the airplane has been established in accordance with Special Flight Condition F-45.

(b) The reference approach path angle must be selected by the applicant and may not exceed 2.5 degrees.

(c) The height for initiation of the landing flare maneuver must be selected by the applicant as a height above the landing surface from which satisfactory flare and landing can be demonstrated in compliance with the provisions of paragraph (d) of this Special Condition.

(d) Landings made for determining compliance with any landing requirement may not require exceptional piloting skill, strength, or alertness. Unless otherwise prescribed, changes in configuration, speed, and thrust, and the utilization of deceleration devices, must be made in accordance with procedures established by the applicant for operation in service. Such procedures must comply with the applicable requirements of § 25.101 and, for purpose of determining landing distances, must include the appropriate time delays prescribed in § 25.101(h)(3). In addition -

(1) The landings must be conducted on a representative smooth hard-surface dry runway, and on a hard-surface wet runway with surface friction characteristics corresponding to an established

wet/dry stopping distance ratio approximating 2.0.

(2) The landing must be preceded by a steady approach, at the approach path angle and landing approach speed prescribed for the particular demonstration, down to a height not greater than the height selected for initiation of the landing flare, or 50 feet above the landing surface, whichever is higher, using a visual or instrument glide slope system for approach angle reference. After reaching the selected flare height or 50 feet above the landing surface, whichever is higher, the flight path may not intentionally be made steeper than the approach path angle prescribed for the demonstration.

(3) The landing must be made without excessive vertical acceleration, without excessive tendency to bounce, nose over, or ground loop, and must be consistently reproducible using normal piloting skill. In addition -

(i) The landing flare maneuver must be performed in the manner established by the applicant for operation in service;

(ii) The normal thrust-management techniques established by the applicant for operation in service must be utilized and may not permit forward thrust to be increased by the flight crew after descending to the selected flare height or to 50 feet above the landing surface, whichever is higher; and

(iii) The rate-of-sink at touchdown may not exceed 3 feet per second.

(4) Thrust reversers and aerodynamic retardation devices may, to the extent prescribed in subparagraphs (5), (6) and (7) of this paragraph, be used in accordance with procedures established by the applicant for operation in service, if they -

(i) Are shown to be safe and reliable;

(ii) Are shown to be capable of being used so that consistent results can be expected for operation in service without requiring exceptional skill, attention, or alertness on the part of the flight crew; and

(iii) Are such that the airplane is controllable under the most unfavorable conditions for operation in service using normal piloting skill.

(5) If thrust reversers are used to decelerate the airplane, the following apply:

(i) The maximum reverse thrust that may be used on any engine may not exceed that with which satisfactory directional control is demonstrated in accordance with Special Flight Condition F-34(e).

(ii) The total amount of reverse thrust that may be used for the purpose of establishing the all-engine and the one-engine-inoperative reference landing distances and scheduled landing runway lengths may not exceed -

(a) That determined in accordance with the provisions of subdivision (i) of this subparagraph, and

(b) That available after a thrust reverser failure on an operating engine provided that the failure of a thrust reverser is the most critical single failure of a deceleration device or system for which failure is not shown to be extremely improbable.

(iii) If reverse thrust varies with altitude or ambient temperature, the effects of such variations on stopping distance must be established.

(6) Deceleration devices, including wheel brakes, which are not automatically actuated may not be actuated prior to derotation and touchdown of the nose wheel unless the procedure is shown to be safe under all landing conditions expected in operations in service, and to provide consistent results without use of exceptional piloting skill.

(7) The pressures of the wheel braking systems may not exceed those specified by the brake manufacturer, and the brakes may not be used so as to cause excessive wear of brakes or tires. In addition, retardation due to wheel braking may not exceed that obtainable with tires representative of the most unfavorable tread design and state of wear intended for operation in service.

(e) Reference landing distance data and scheduled landing runway length data must include correction factors for the airplane -

(1) For runways with established wet/dry stopping distance ratios of 1 to 4 inclusive, and

(2) For wind, corresponding to not more than 50 percent of the nominal wind component along the landing path opposite to the direction of landing, and not less than 150 percent of the nominal wind component along the landing path in the direction of landing.

F-16 Landing Approach Speeds.

Reference landing approach speed(s) for approach with all engines operating, and with one engine inoperative, in the configuration appropriate to each such condition, must be established in accordance with the following:

(a) All engines operating. The all-engines-operating reference landing approach speed, V_{REF}, must be selected by the applicant and must provide sufficient controllability, maneuverability, and performance, under all normal operating conditions, to enable the landing to be safely completed in accordance with the provisions of Special Flight Condition F-15(d)(3), and safely discontinued at any point on the approach path prior to initiating the landing flare maneuver. In addition, V_{REF} may not be less than -

(1) 1.3 V_{MIN}, or 1.25 V_{MIN} if the airplane has an operating automatic speed control system for approach and landing that will maintain airspeed within ±5 knots of the selected approach speed under realistic environmental conditions equivalent to the wind shear and gusts prescribed in Advisory Circular 20.57A. Short term airspeed fluctuations associated with gusts may be disregarded.

(2) 1.05 V_{MCL}, determined in accordance with Special Flight Condition F-22(c);

(3) A speed at which compliance is shown with the landing configuration climb requirement of Special Flight Condition F-11;

(4) A speed at which compliance is shown with Special Flight Conditions F-4(c); or

(5) V_{REF} used to show compliance with Special Flight Condition F-37(a)(1) and (b)(1).

(b) One engine inoperative. The one-engine-inoperative reference landing approach speed, V_{REF-1}, must be selected by the applicant and must provide sufficient controllability, maneuverability, and performance, under all normal operating conditions, to enable the landing to be safely completed in accordance with Special Flight Condition F-15(d)(3), and to enable the approach to be safely discontinued with one-engine-inoperative at any point on the approach path prior to initiating the landing flare maneuver, and safely continued to a safe landing in the event of failure of a second critical engine. In addition, V_{REF-1}, may not be less than -

(1) V_{REF};

(2) V_{MCL-2} determined in accordance with Special Flight Condition F-22(d);

(3) A speed at which compliance is shown with the one-engine-inoperative climb requirements of Special Flight Condition F-12(d);

(4) A speed at which compliance is shown with the two-engines-inoperative continued-approach requirements of Special Flight Condition F-13;

(5) A speed at which compliance is shown with the requirements of Special Flight Condition F-4(c); or

(6) V_{REF-1} used to show compliance with Special Flight Condition F-37(a)(2) and (b)(2).

F-17 Reference Landing Distances.

(a) The reference landing distances must be established as the sum of the air segment, the transition segment, and the stopping segment where -

(1) The air segment is the horizontal distance from the point at which the lowest part of the airplane is 50 feet above the landing surface when the airplane is on the approach path, to the point of initial contact with the landing surface;

(2) The transition segment begins at the end of the air segment, and is the distance traversed to the point of initial application of any deceleration device following touchdown; and

(3) The stopping segment begins at the end of the transition segment, and is the distance necessary to bring the airplane to a complete stop, with the failure conditions specified in subparagraph (c) of this Special Condition, measured to the most forward part of the airplane.

(b) In determining the reference landing distances compliance must be shown with Special Flight Condition F-15(d), and the following:

(1) The approach path angle must equal the reference approach path angle.

(2) For the all-engine-operating landings, the speed at initiation of the landing flare maneuver must not be less than the reference landing approach speed, V_{REF}, established in accordance with Special Flight Condition F-16(a).

(3) For the one-engine-inoperative landings, the speed at initiation of the landing flare maneuver must not be less than the one-engine-inoperative reference landing approach speed, V_{REF-1}, established in accordance with Special Flight Condition F-16(b).

(c) The length of the stopping segment must be established -

(1) For the all-engine-operating landings with the most critical single failure of a deceleration device or system, the failure of which is not shown to be extremely improbable; and

(2) For the one-engine-inoperative landings with the most critical single failure of a deceleration device or system that remains operative after shut down of the most critical engine and for which failure is not shown to be extremely improbable.

F-18 Scheduled Landing Runway Lengths.

(a) Scheduled landing runway lengths must be based on the reference landing distances determined in accordance with Special Flight Condition F-17, increased in length by the factors prescribed in subparagraphs (a)(1) and (a)(2) of this Special Condition.

(1) The reference landing distances must be increased in length by the distance increments shown to result from deviations in landing approach speed to V_{REF} + 10 knots for all-engine landings, and to V_{REF-1} + 5 knots for one-engine-inoperative landings, with the approach path angle equal to one degree less than the reference approach path angle, or two degrees greater than the reference approach path angle if the latter angular deviation results in longer scheduled landing runway lengths, and

(2) For all-engine operating landings, the stopping segment of the landing distance established under subparagraph (a)(1) of this Special Condition must be increased in length by 15 percent.

(b) In landing demonstrations made to show compliance with the provisions of this Special Condition, the speed reduction(s) between initiation of the landing flare maneuver and initial contact with the landing surface may not be less than the speed reduction(s) associated with the air segment of the corresponding reference landing distance. In addition, during the transition segment, the time delays and the derotation technique in terms of control inputs, must be the same as those used in establishing the transition segment of the corresponding reference landing distance.

F-20 Longitudinal Control.

In addition to the requirements in § 25.145 the following apply:

The airplane must have sufficient maneuvering capability, in smooth and turbulent air and in turning maneuvers, to attain the positive and negative incremental acceleration values (delta g relative to unaccelerated flight) specified in the following subparagraphs, with the critical centers of gravity and weights, and the airplane trimmed for the initial flight conditions specified.

(e) Approach. 0.5g with the schedule approach speeds with an approach path angle of 3 degrees and with the appropriate landing configurations for all-engines-operating and for one-engine-inoperative.

F-33 Ground Handling - Longitudinal Stability and Control.

In lieu of the requirements in § 25.231, the following apply:

There may be no uncontrollable longitudinal stability characteristics during takeoff or landing, or when rebound occurs during these maneuvers. The controllability must be precise and without large discontinuities that may result in rapid changes in heading or in turn capability. In addition -

(a) Wheel brakes must operate smoothly and may not cause any undue tendency to nose over;

(b) At touchdown speeds of at least 10 knots lower than the touchdown speeds established for operation in service, and at the most forward c.g., it must be possible to lower the nose smoothly to the runway surface after touchdown without encountering either excessive loads or rebound;

(c) Application of aerodynamic deceleration devices may not cause longitudinal pitching that cannot be readily arrested;

(d) Satisfactory procedures must be established for the use of aerodynamic deceleration devices during landing, including landings with one and two engines inoperative; and

(e) Unless their failure can be shown to be extremely remote, the effects of partial and full failure of aerodynamic deceleration devices on ground controllability must be determined for all reasonably expected environmental conditions.

F-34 Ground Handling - Directional Stability and Control.

In lieu of the requirements in § 25.233, the following apply:

There may be no uncontrollable directional stability characteristics during takeoff or landing, or when rebound occurs during these maneuvers. The controllability must be precise and without large discontinuities that may result in rapid changes in heading or in turning capability. In addition -

(a) There may be no uncontrollable ground looping tendencies up to the maximum demonstrated crosswind component established under Special Flight Condition F-35.

(b) The airplane must be satisfactorily controllable, without exceptional piloting skill or alertness, in landings at landing speeds established for operation in service and with all engines operating at minimum available thrust, without using brakes or engine thrust to maintain a straight path.

Compliance with this paragraph may be shown during the all-engines-operating landings with minimum available thrust that are made in conjunction with other tests.

(c) The airplane must have adequate directional control -

(1) During taxiing;

(2) Whenever aerodynamic deceleration devices are applied;

(3) During operations on runways having the types and degrees of roughness expected to be encountered in operation in service; and

(4) During operations on the types of runway surfaces expected to be encountered in operation in service.

Compliance with subparagraphs (1) ans (2) of this paragraph may be shown during taxiing prior to takeoffs made in conjunction with other tests.

(d) If thrust reversers are used during landings to decelerate the airplane, satisfactory procedures must be established for their use with -

(1) All engines operating, and

(2) One engine inoperative.

(e) Using the procedures in paragraph (d) of this Special Condition, satisfactory directional control must be demonstrated without excessive lateral deviation following a failure of the critical thrust reverser at the most critical point during landing with -

(1) The landings made on a wet runway having surface friction characteristics corresponding to an established wet/dry stopping distance ratio approximating 2.0, in a crosswind with a 90-degree component of not less than 10 knots from the unfavorable direction, and corresponding headwind component not exceeding 10 knots;

(2) The rudder control forces not exceeding 150 pounds;

(3) Directional control maintained by the use of primary aerodynamic controls and rudder pedal nose-wheel steering, if applicable, and without differential braking;

(4) The most unfavorable configuration selected for landing;

(5) The most unfavorable center of gravity;

(6) Any weight within the range of weights scheduled for landing; and

(7) Accountability for the effects of reverse thrust variations on controllability when reverse thrust varies with altitude or ambient temperature.

(f) If reverse thrust varies with altitude or ambient temperature, the effects of such variations on controllability must be established.

F-35 Demonstrated Crosswind Capability.

In lieu of the requirements in § 25.237, the following apply:

(a) A 90-degree cross component of wind velocity, shown to be safe for takeoff and landing on dry runways, must be established at the most critical weights. The minimum demonstrated crosswind component may not be less than 25 knots measured at a height of 32.8 feet (10 meters) above the runway surface, or alternatively, not less than 27 knots measured at a height of 50 feet above the runway surface.

(b) The approximate variation in the maximum permissible 90-degree cross component of wind velocity established in accordance with paragraph (a) of this Special Flight Condition must be established for wet and icy runways by demonstration on runways having established wet/dry stopping distance ratios of -

(1) 1 through 4; or

(2) Approximately 2, and extrapolating by any suitable method for greater established wet/dry stopping distance ratios up to 4.0.

F-37 Low-Speed Characteristics.

At the maximum forward c.g. limit, it must be possible to safely land the airplane in accordance with the provisions of Special Flight Condition F-15(d)(3)(i) and (ii), using -

(a) An approach path angle of 3.0 degrees, with -

(1) All engines operating at an approach speed not greater than $0.9V_{REF}$, or V_{REF} minus 10 knots if the automatic speed control provision of Special Flight Condition F-16(a)(1) is applicable; and

(2) One-engine-inoperative at an approach speed not greater than $0.95\ V_{REF-1}$; and

(b) An approach path angle not less than 6.0 degrees, with -

(1) All engines operating at an approach speed equal to V_{REF}; and

(2) One engine inoperative at an approach speed equal to V_{REF-1}.

F-48 Performance Information.

In lieu of the requirements in § 25.1587(c), the following apply:

The Airplane Flight Manual must contain a summary of the performance information computed in showing compliance with applicable provisions of Part 25 and these Special Conditions, together with descriptions of the airplane configuration and operating conditions applicable to such information, including the following:

(a) Performance Data.

(4) Landing. The following data must be presented for the variables prescribed in subparagraphs (a)(1) and (a)(4) of Special Flight Condition F-15, and, in addition, must be presented for the range of weights between maximum landing and maximum takeoff weights (determined by extrapolation):

(i) Reference landing approach speeds as prescribed in Special Flight Condition F-16;

(ii) Reference landing distances as prescribed in Special Flight Condition F-17;

(iii) Scheduled landing runway lengths as prescribed in Special Flight Condition F-18;

(iv) Reference landing distances, with all engines operating and with one engine inoperative, using all deceleration devices except thrust reversers;

(v) Reference landing distances, with all engines operating, using all deceleration devices except wheel brakes;

(vi) Height for initiation of the landing flare associated with the reference landing distance, as prescribed in Special Flight Condition F-15(c); and

(vii) The maximum reverse thrust used for determining the reference landing distances and scheduled landing runway lengths, determined in accordance with Special Flight Condition F-15(d)(5).